CPC307

PC/104-*Plus*
Vortex86DX Based
CPU Module

User Manual

Rev. 001 E

July 2010

P R E L I M I N A R Y

Product Title: CPC307
Document name: CPC307 User Manual
Manual version: 001 E
Ref. doc. v.: 1.1 R (467444 038)

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Revision Record

Rev. Index	Brief Description of Changes	Board Index	Date of Issue
001	Initial preliminary version	CPC307 v 2.0	Luly 2010

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Fastwel welcomes suggestions, remarks and proposals regarding the form and the content of this Manual.

Notation Conventions

Warning, ESD Sensitive Device!

This symbol draws your attention to the information related to electro static sensitivity of your product and its components. To keep product safety and operability it is necessary to handle it with care and follow the ESD safety directions.

Warning!

This sign marks warnings about hot surfaces. The surface of the heatsink and some components can get very hot during operation. Take due care when handling, avoid touching hot surfaces!

Caution: Electric Shock!

This symbol warns about danger of electrical shock (> 60 V) when touching products or parts of them. Failure to observe the indicated precautions and directions may expose your life to danger and may lead to damage to your product.

Warning!

Information marked by this symbol is essential for human and equipment safety.
Read this information attentively, be watchful.

Note...

This symbol and title marks important information to be read attentively for your own benefit.

General Safety Precautions

This product was developed for fault-free operation. Its design provides conformance to all related safety requirements. However, the life of this product can be seriously shortened by improper handling and incorrect operation. That is why it is necessary to follow general safety and operational instructions below.

Warning!

All operations on this device must be carried out by sufficiently skilled personnel only.

Warning!

When handling this product, special care must be taken not to hit the heatsink (if installed) against another rigid object. Also, be careful not to drop the product, since this may cause damage to the heatsink, CPU or other sensitive components as well.

Please, keep in mind that any physical damage to this product is not covered under warranty.

Note:

This product is guaranteed to operate within the published temperature ranges and relevant conditions. However, prolonged operation near the maximum temperature is not recommended by Fastwel or by electronic chip manufacturers due to thermal stress related failure mechanisms. These mechanisms are common to all silicon devices, they can reduce the MTBF of the product by increasing the failure probability. Prolonged operation at the lower limits of the temperature ranges has no limitations.

Caution, Electric Shock!

Before installing this product into a system and before installing other devices on it, always ensure that your mains power is switched off.

Always disconnect external power supply cables during all handling and maintenance operations with this module to avoid serious danger of electrical shock.

Unpacking, Inspection and Handling

Please read the manual carefully before unpacking the module or mounting the device into your system. Keep in mind the following:

ESD Sensitive Device!

Electronic modules and their components are sensitive to static electricity. Even a non-perceptible by human being static discharge can be sufficient to destroy or degrade a component's operation! Therefore, all handling operations and inspections of this product must be performed with due care, in order to keep product integrity and operability:

- Preferably, unpack or pack this product only at EOS/ESD safe workplaces. Otherwise, it is important to be electrically discharged before touching the product. This can be done by touching a metal part of your system case with your hand or tool. It is particularly important to observe anti-static precautions when setting jumpers or replacing components.
- If the product contains batteries for RTC or memory back-up, ensure that the module is not placed on conductive surfaces, including anti-static mats or sponges. This can cause short-circuit and result in damage to the battery and other components.
- Store this product in its protective packaging while it is not used for operational purposes.

Unpacking

The product is carefully packed in an antistatic bag and in a carton box to protect it against possible damage and harmful influence during shipping. Unpack the product indoors only at a temperature not less than +15°C and relative humidity not more than 70%. Please note, that if the product was exposed to the temperatures below 0°C for a long time, it is necessary to keep it at normal conditions for at least 24 hours before unpacking. Do not keep the product close to a heat source.

Following ESD precautions, carefully take the product out of the shipping carton box. Proper handling of the product is critical to ensure correct operation and long-term reliability. When unpacking the product, and whenever handling it thereafter, be sure to hold the module preferably by the front panel, card edges or ejector handles. Avoid touching the components and connectors.

Retain all original packaging at least until the warranty period is over. You may need it for shipments or for storage of the product.

Initial Inspection

Although the product is carefully packaged, it is still possible that shipping damages may occur. Careful inspection of the shipping carton can reveal evidence of damage or rough handling. Should you notice that the package is damaged, please notify the shipping service and the manufacturer as soon as possible. Retain the damaged packing material for inspection.

After unpacking the product, you should inspect it for visible damage that could have occurred during shipping or unpacking. If damage is observed (usually in the form of bent component leads or loose socketed components), contact Fastwel's official distributor from which you have purchased the product for additional instructions. Depending on the severity of the damage, the product may even need to be returned to the factory for repair. DO NOT apply power to the product if it has visible damage. Doing so may cause further, possibly irreparable damage, as well as result in a fire or electric shock hazard.

If the product contains socketed components, they should be inspected to make sure they are seated fully in their sockets.

Handling

In performing all necessary installation and application operations, please follow only the instructions supplied by the present manual.

In order to keep Fastwel's warranty, you must not change or modify this product in any way, other than specifically approved by Fastwel or described in this manual.

Technical characteristics of the systems in which this product is installed, such as operating temperature ranges and power supply parameters, should conform to the requirements stated by this document.

Retain all the original packaging, you will need it to pack the product for shipping in warranty cases or for safe storage. Please, pack the product for transportation in the way it was packed by the supplier.

When handling the product, please, remember that the module, its components and connectors require delicate care. Always keep in mind the ESD sensitivity of the product.

Three Year Warranty

Fastwel Co. Ltd. (Fastwel), warrants that its standard hardware products will be free from defects in materials and workmanship under normal use and service for the currently established warranty period. Fastwel's only responsibility under this warranty is, at its option, to replace or repair any defective component part of such products free of charge.

Fastwel neither assumes nor authorizes any other liability in connection with the sale, installation or use of its products. Fastwel shall have no liability for direct or consequential damages of any kind arising out of sale, delay in delivery, installation, or use of its products.

If a product should fail through Fastwel's fault during the warranty period, it will be repaired free of charge. For out of warranty repairs, the customer will be invoiced for repair charges at current standard labor and materials rates.

Warranty period for Fastwel products is 36 months since the date of purchase.

The warranty set forth above does not extend to and shall not apply to:

1. Products, including software, which have been repaired or altered by other than Fastwel personnel, unless Buyer has properly altered or repaired the products in accordance with procedures previously approved in writing by Fastwel.
2. Products, which have been subject to power supply reversal, misuse, neglect, accident, or improper installation.

Returning a product for repair

1. Apply to Fastwel company or to any of the Fastwel's official representatives for the Product Return Authorization.
2. Attach a failure inspection report with a product to be returned in the form, accepted by customer, with a description of the failure circumstances and symptoms.
3. Carefully package the product in the antistatic bag, in which the product had been supplied. Failure to package in antistatic material will VOID all warranties. Then package the product in a safe container for shipping.
4. The customer pays for shipping the product to Fastwel or to an official Fastwel representative or dealer.

1 Introduction

This document presents general information on CPC307 CPU module, the details of its proper and safe installation, configuration and operation. The issues of PC/104 modules and external devices connection are also considered. This document applies to the module version 2.0.

1.1 Module Introduction

Fastwel CPC307 is designed for applications requiring high-performance low-power industrial controller with CAN interface. Fastwel CPC307 conforms to PC/104-Plus specification and is compatible with a large number of peripheral and power supply modules delivered by a wide range of manufacturers.

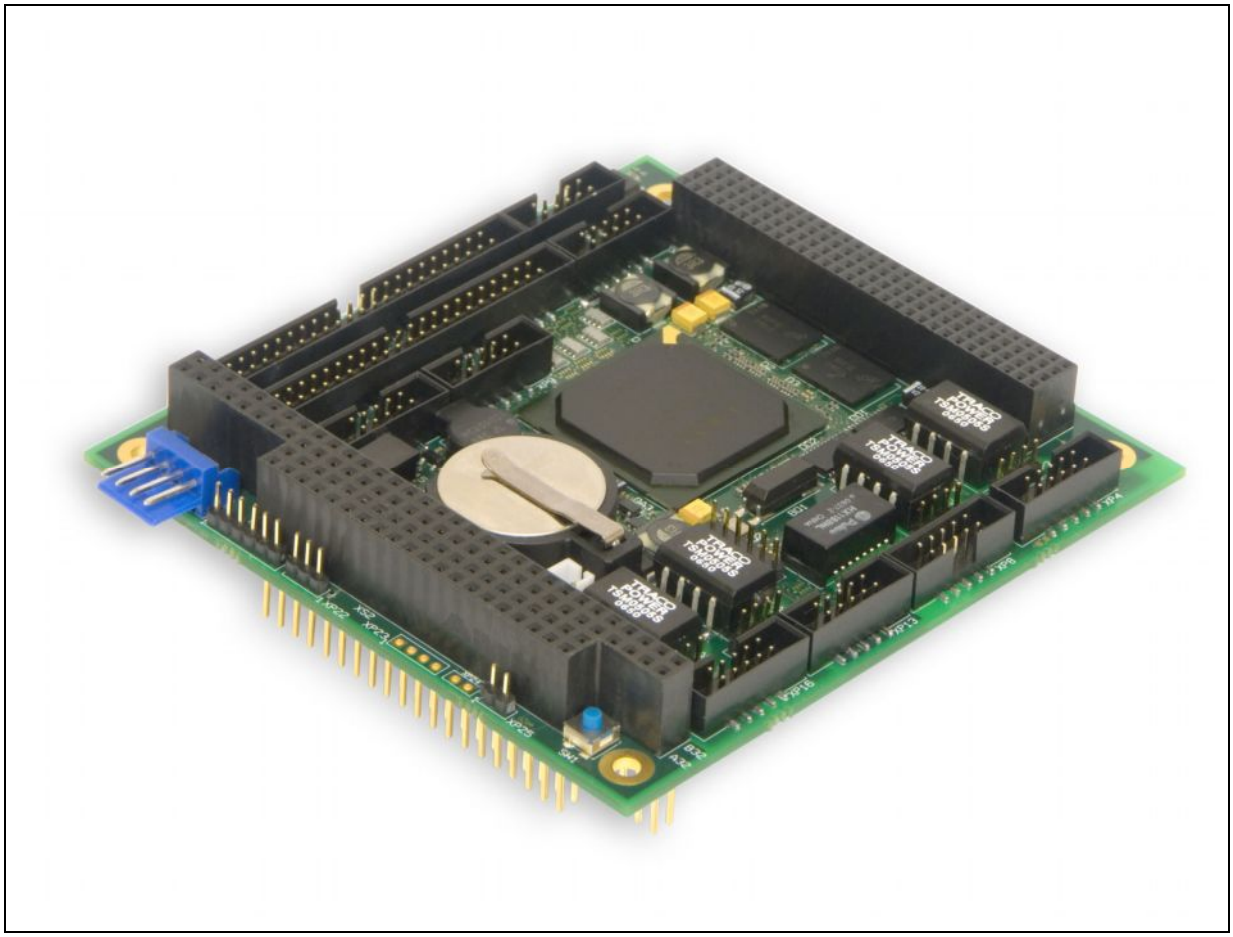
Based on x86-compatible Vortex86DX System-on-Chip (SoC) operating at 600 MHz, the module bears 256 MB soldered DDR2 memory and wide range of input/output interfaces. CPC307 allows system designers simple programming and provides portability of previously developed libraries for x86 architecture with DOS, Linux, Windows XP Embedded, and QNX support. Having two isolated CAN ports onboard along with a wide set of popular industrial interfaces, such as RS232, RS485, RS422, USB, and Fast Ethernet, CPC307 offers integrated functionality which is usually achieved by using several products from different manufacturers.

For debugging purposes or for applications requiring graphical interface, CPC307 can operate together with Fastwel VIM301 graphics controller module providing VGA, LVDS, TFT, and SGD interfaces.

The module is designed for operation at temperatures from -40°C to +85°C.

CPC307 is supplied with the preinstalled FDOS 6.22 operating system and supports MS DOS 6.22, QNX 6.4, and Linux 2.6 operating systems.

Figure 1.1: CPC307 Module Appearance



The appearance may vary for different versions of the module.

1.2 CPC307 Versions

At the present time the CPC307 module is manufactured in several versions differing in interface capabilities.

Table 1.1: CPC307 Versions

Name	CPC307-01	CPC307-02	CPC307-03	CPC307-04	CPC307-05
Processor	Vortex86DX (600 MHz)				
RAM	256 MB				
Flash Disk	1 GB	1 GB	1 GB	–	1 GB
IDE	+	+	+	+	+
2xRS-232/485/422	+	+	+	+	+
2xRS-232	+	+	+	+	+
2xRS-422/485	+	+	–	+	+
2xCAN	+	+	–	+	+
LPT	+	+	+	+	+
4xUSB 2.0	+	+	+	+	+
PCI-104 Connector	–	+	+	+	+
LAN 10/100	–	+	+	+	+
8xGPIO	–	+	+	+	+
2xI2C	–	+	+	+	+
2xMicroSD	–	–	–	+	–
Coated	–	–	–	–	+
-50°C…+90°C	–	–	–	–	+

1.3 Delivery Checklist

Table 1.2: CPC307 Supplied Set

Name	Description
CPC30701 CPC30702 CPC30703 CPC30704 CPC30705	CPC307 processor module
ACS00023	DB9F to IDC10 2 mm adapter cable for connection to COM port (685611.082)
–	Mounting standoffs kit
–	Jumpers set
–	CD ROM with documentation and service software (467369.009)
–	Antistatic bag and consumer carton box

Note:

Keep the antistatic bag and the original package at least until the warranty period is over. It can be used for future storage or warranty shipments.

1.4 Additional Accessories

Peripheral devices are attached to the module directly or via additional accessories and cables listed in the following table. Additional accessories are not supplied with the CPU module, are ordered separately.

Table 1.3: CPC307 Additional Accessories

Name	Description
CDM02	Adapter module for connection of 3.5" HDD or CD-ROM drive (469535.023)
ACS00010	FC44 cable for 2.5" HDD connection to 44-contact header
ACS00031-03	PHR-2 connector set. Includes JST PHR-2 socket and a set of contacts SPH-002T-P0.5S for connection to XP18 header of the module (467941.016-02)
ACS00038	Connector set for connection of a power supply unit to the module. Includes AMP 4-171822-4 socket and a set of contacts 170262-1 for connection to XP20 power connector of the module
ACS00040-01	Leotronics 2040-3102 socket. Recommended counterpart for XP4, XP5, XP6, XP8, XP9, XP13, XP15, XP16 headers of the module
ACS00040-05	Leotronics IDC44 2 mm socket. Recommended counterpart for XP11, XP12 headers of the module
ACS00042	Null modem cable
ACS00043-01	PS/2 cable. Recommended counterpart for XP21 header of the module

2 Technical Specifications

2.1 General

- Form-factor:
  - PC/104-Plus
- CPU: Integrated in DM&P Vortex86DX SoC
  - 600 MHz
  - 32-bit x86 compatible core
  - 16-bit memory bus
  - Math coprocessor
  - 32 KB L1, 256 KB L2 cache
  - 6-stage pipeline
- System memory:
  - 256 MB soldered DDR2 SDRAM
  - DDR333
- IDE port:
  - One IDE channel (Primary)
  - Support for up to two UltraDMA-100 IDE devices with NAND Flash disabled in BIOS Setup and if the microSD sockets (XS3, XS4) are not populated
- Solid State Disk (except for CPC30704)
  - Soldered
  - 1 GB NAND flash
  - IDE interface
  - Can be used as bootable device
  - MS DOS-compatible Fastwel file system
- SD controller (for CPC30704 only):
  - Up to two microSD cards (bottom side sockets)
  - Up to 4 GB each card
- PS/2:
  - PS/2 keyboard and mouse interface
- Remote Reset/IRQ:
  - Discrete remote reset/interrupt input
  - 500V optoisolation
- USB:
  - Four USB 2.0 channels
  - One device can be connected to each channel

- LAN:
  - One Fast Ethernet port 10/100 Mbit/s (except for CPC30701)
  - 500 V isolation
- Serial ports:
  - Six serial ports (four for CPC30703)
  - High speed NS16C550 compatible
  - COM1, COM2: RS232/422/485, complete, up to 115.2 Kbaud
  - COM3, COM4: RS232, complete, up to 115.2 Kbaud
  - COM5, COM6: RS422/485, up to 3.6 Mbaud, 500 V isolation (except for CPC307-03)
  - Console operation via COM1 ... COM4
- CAN:
  - 2xCAN 2.0b (except for CPC307-03)
  - SJA1000T controller
  - Up to 1 Mbit/s
  - 500 V isolation
- Parallel port:
  - SPP/ECP/EPP compatible
- Expansion buses:
  - PCI and ISA
- Redundancy support
- GPIO:
  - 8 discrete I/O lines
- I2C:
  - 2 ports, via GPIO port
- Three watchdog timers:
  - One with fixed timeout period of 1.6 s
  - Two integrated in Vortex86DX with programmable timeout period
- Flash BIOS:
  - Main BIOS: 512 KB, soldered
  - Reserve: 256 KB, integrated in the controller
  - In-system modification
  - Automatic switching
- RTC:
  - On-board real time clock with Li battery backup
- Safety:
  - System configuration settings stored in CMOS+Serial FRAM (64 Kb)
  - Possibility of batteryless operation
- Software support:
  - AMI BIOS
  - Preinstalled FDOS 6.22operating system
  - Support for FDOS 6.22, MS DOS 6.22, QNX 6.4, and Linux 2.6 operating systems

2.2 Power Requirements

The module can be powered via XS1 and XS2 connectors. Additionally, power can be supplied via XP20 (4-contact AMP 4-171826-4) power connector by an external DC power source. Power supply unit should provide starting current, which is 2.1 A for CPC307-02 version. It is allowed to use power supply units with current limiting not less than 1.2 A. Selecting a power supply unit, the starting current should be considered as well as the consumption current of expansion modules.

Consumption current typical valuation is 0.6 A.

Table 2.1: Power Supply Requirements

Connectors	Power Voltage	Voltage Limits	Consumption current	Starting current
PC/104 and PCI-104	+5 V	From +4.75V to +5.25V	1 A	2.1 A
XP20	+5 V	From +4.8V to +5.3V	1 A	2.1 A

Important:

Please, find important notes on power supply in subsection 3.2.17 of this document.

2.3 Environmental

- Operating temperature range: –40°C to +85°C (-50°C to +90°C for CPC30705)
- Storage temperature: –55°C to +90°C
- Relative humidity: up to 80% at 25°C, noncondensing

Note:

Protective coating of CPC307 versions makes them resistant to damp heat cyclic exposure at temperatures up to +55±2°C and relative humidity of up to 93±3%.

2.4 Mechanical

- Vibration (5 ... 2000 Hz) – 10g;
- Single shock, peak acceleration – 150 g;
- Multiple shock, peak acceleration – 50 g.

2.5 Dimensions and Weight

- Dimensions, not more: 101.5 × 90.6 × 23.7 mm (4” × 3.57” × 0.93”)
  (see also Overall and Mounting Dimensions for details)
- Weight:

Version	Weight, kg
CPC307-01	0.120
CPC307-02	0.125
CPC307-03	0.120
CPC307-04	0.125
CPC307-05	0.135

2.6 MTBF

- MTBF for CPC307 is 200000 hours.

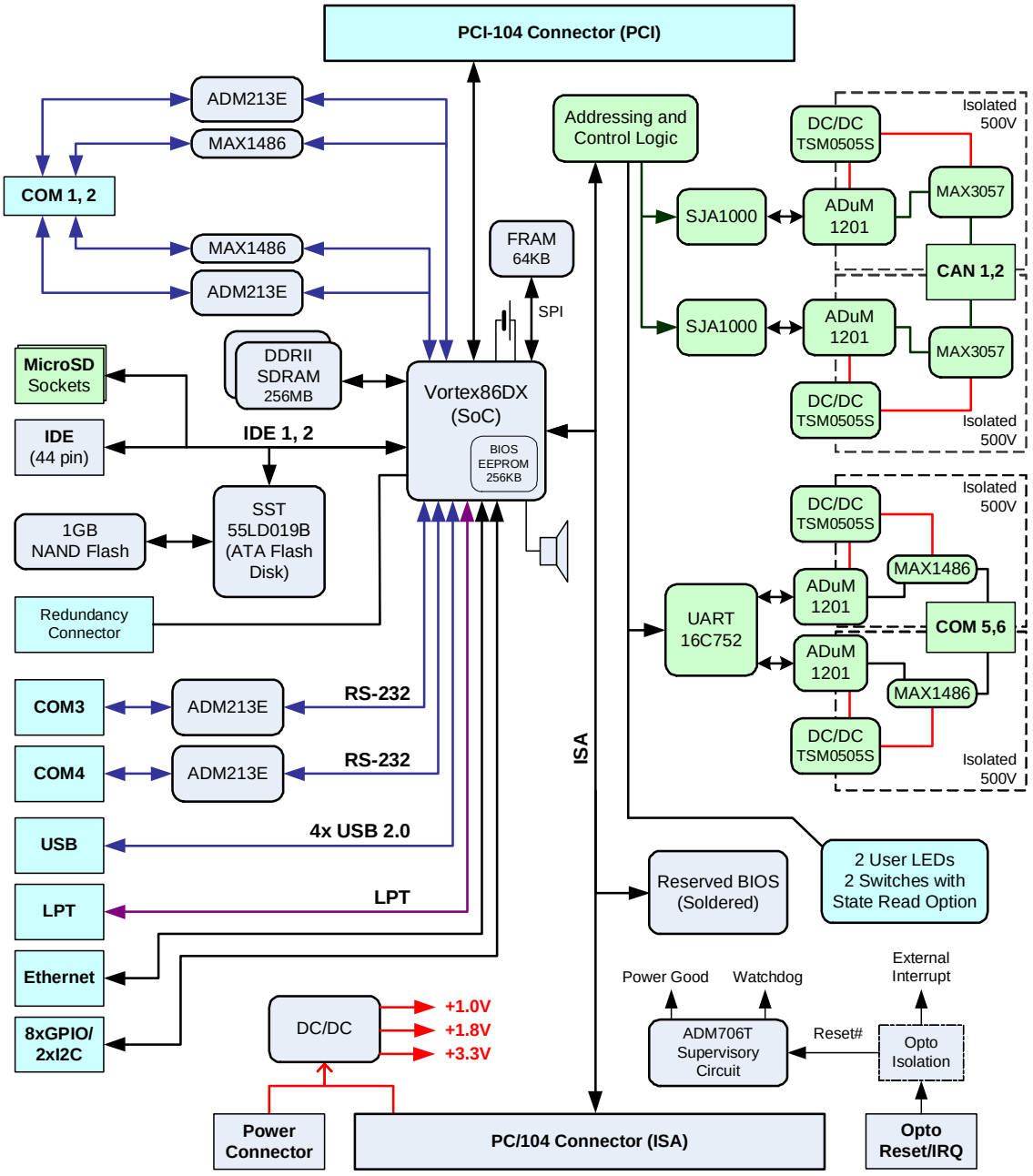
  The value is calculated according to: Telcordia Issue 1 model, Method I Case 3, for continuous operation at a surface location, at normal environmental conditions and at ambient temperature 30°C.

3 Functional Description

3.1 Structure and Layout

Functional diagram of the CPC307 module is shown in Figure 3.1.

Figure 3.1: CPC307 Block Diagram



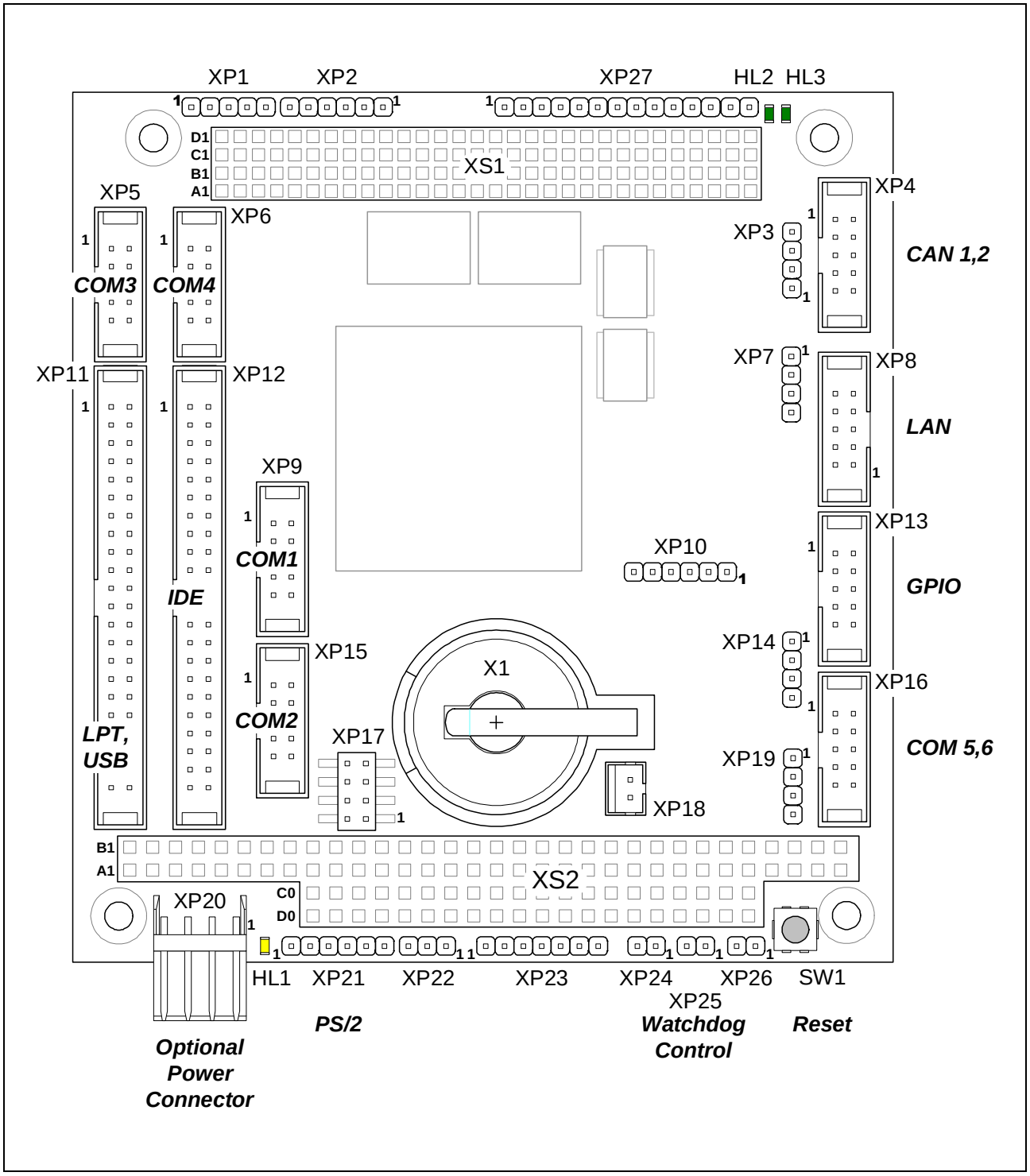
CPC307 includes the following main functional units:

- SoC Vortex86DX
- 256 MB soldered DDR2 SDRAM system memory;
- IDE port with support for up to two UltraDMA/100 devices (XP12);
- SD controller (IDE, for CPC30704 only);
- Onboard NAND flash-disk, 1 GB (IDE; except for CPC30704);
- PS/2 keyboard/mouse port;
- Optoisolated (500V) remote Reset/interrupt input;
- Four USB 2.0 channels;
- Fast Ethernet port, 10/100 Mbit/s, 500V isolation (except for CPC30701);
- Serial ports:
  - COM1, COM2: RS232/422/485, up to 115.2 Kbaud, complete;
  - COM3, COM4: RS232, up to 115.2 Kbaud, complete;
  - COM5, COM6: RS422/485, up to 3.6 Mbaud, 500V isolation (except for CPC30703)
  - Console operation via COM1 ... COM4
- CAN:
  - Two CAN 2.0b ports (except for CPC307-03), SJA1000T controller; Up to 1 Mbit/s; 500 V isolation
- Parallel port, SPP/ECP/EPP compatible
- PCI and ISA expansion buses
- Redundancy support
- GPIO: 8 discrete I/O lines
- I2C: 2 ports, via GPIO port
- Three watchdog timers:
  - One with fixed timeout period of 1.6 s
  - Two integrated in Vortex86DX with programmable timeout period
- Flash memory based reserved BIOS, in-system modification;
- Real time clock with Li battery backup;
- CMOS+SFRAM (64 Kbit) for BIOS configuration storage;

Layouts of main CPC307 components and connectors on top and bottom sides are presented in Figures 3.2 and 3.3 respectively.

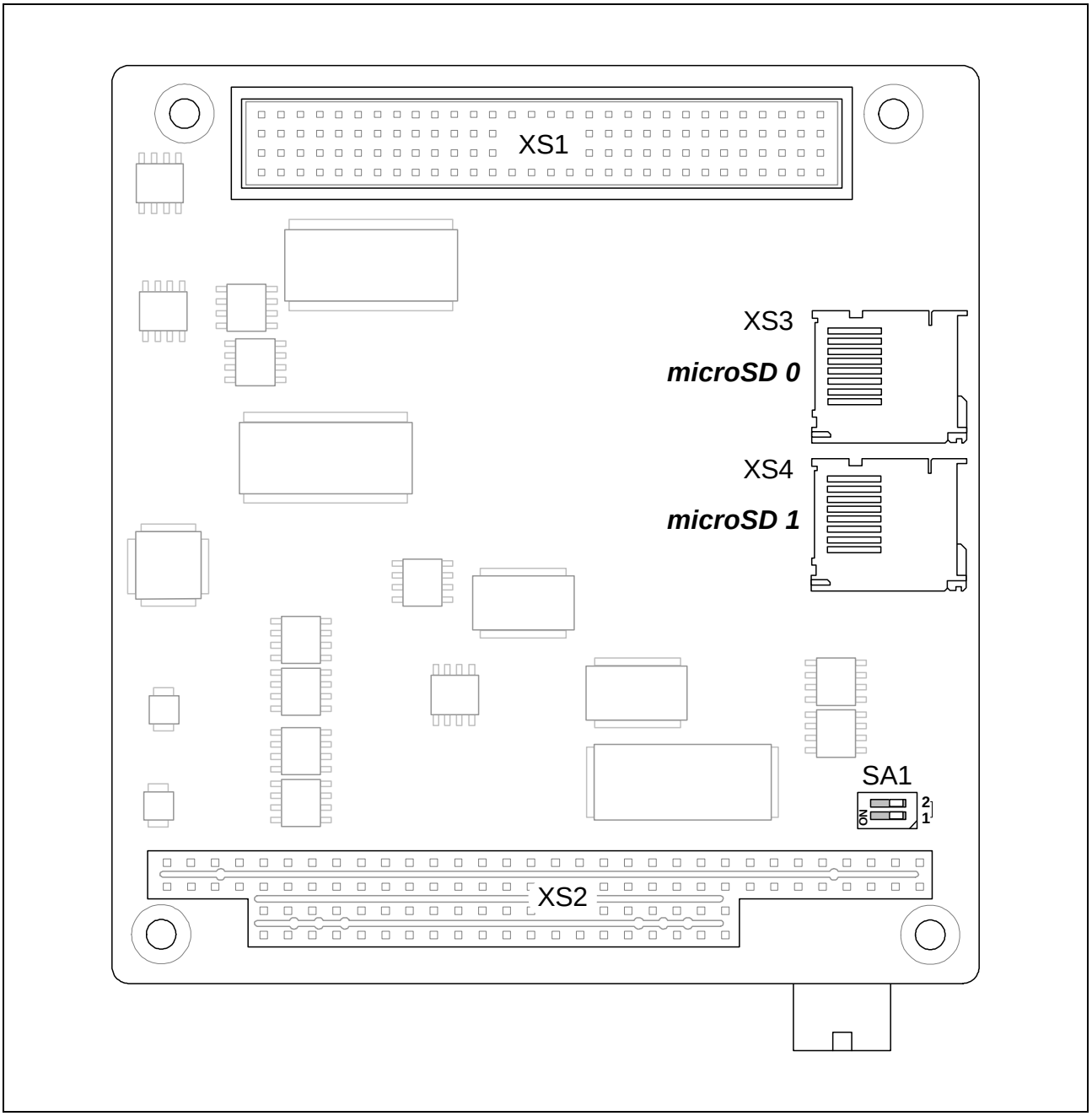
External connections are illustrated in Chapter 4.

Figure 3.2: Top Side: Connectors and Main Components Layout



The layout may slightly differ for various versions of the module.

Figure 3.3: Bottom Side: Connectors and Main Components Layout (CPC30704)



The layout may slightly differ for various versions of the board.

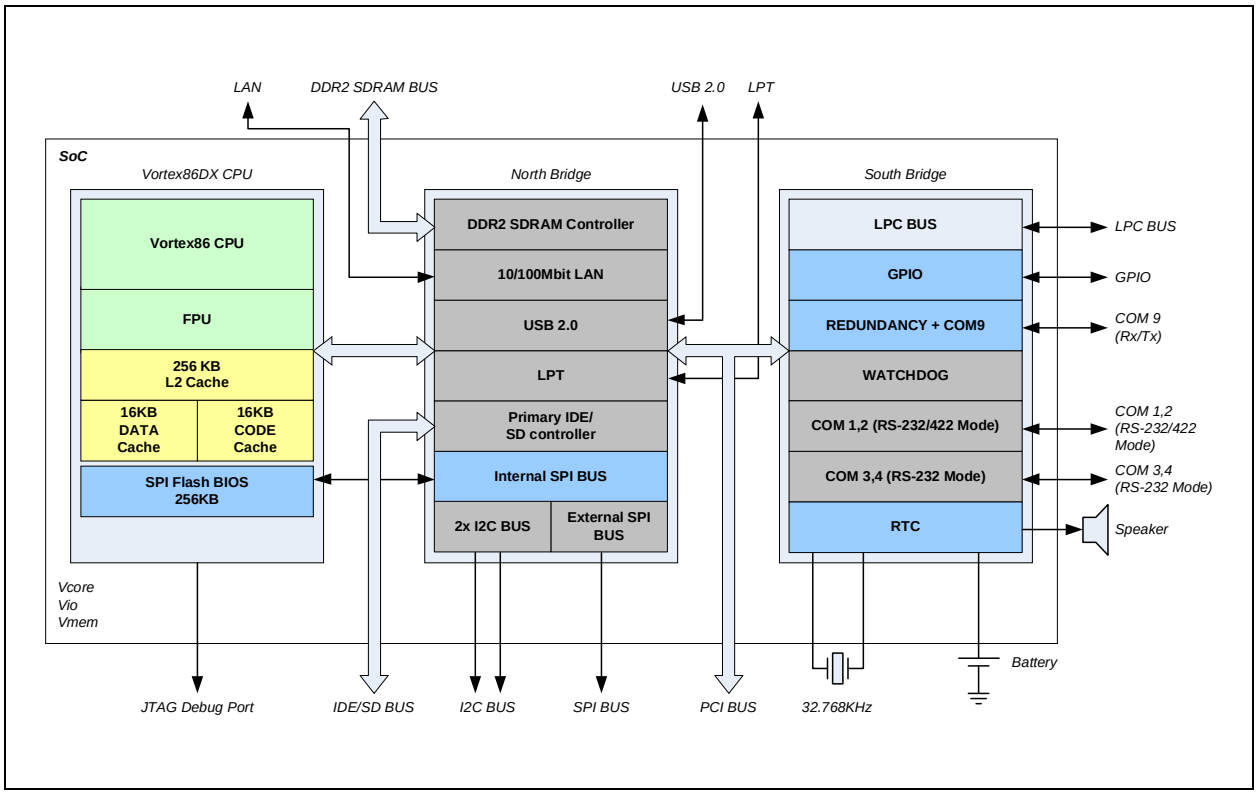
3.2 Functional Description

3.2.1 Vortex86DX SoC

DM&P Vortex86DX includes the following main functional units:

- 32-bit x86 compatible core operating at 600 MHz;
- 32 KB L1, 256 KB L2 cache;
- Math coprocessor;
- 16-bit DDR2 SDRAM memory bus;
- IDE/SD controller;
- Five RS-232 serial ports;
- Universal parallel port;
- Four USB 2.0 ports;
- PS/2 keyboard/mouse port;
- PCI, ISA, LPC, and SPI bus controllers;
- Two I2C interfaces;
- Built-in Ethernet 10/100 controller;
- RTC;
- CMOS memory for configuration storage;
- Integrated flash-memory for BIOS storage;
- Integrated redundancy system;
- Two programmable watchdog timers.

Figure 3.4: Vortex86DX SoC Block Diagram



3.2.2 SDRAM Memory

Two DDR2 SDRAM memory chips operating at 266 MHz are soldered on board. Total memory size is 256 MB.

3.2.3 IDE Interface

One-channel IDE controller allows connection of up to two IDE devices. UDMA-100 mode is supported.

If soldered NAND flash disk is enabled, one external device can be connected to XP12. If the onboard flash disk is disabled, two external drives can be connected as illustrated in the following table.

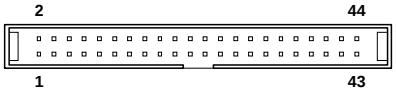
Table 3.1: IDE Channel: Devices Connection Variants

Onboard Flash Disk	XP12 (Primary IDE)	XS3, XS4 (microSD 1, 2)
Enabled	One device	No connection
Disabled	Two devices	No connection
Disabled	No connection	Two devices

Important:

Before connecting external devices to CPC307-04 make sure that no microSD slot is populated and “IDE” mode is selected for Primary IDE in BIOS Setup. Simultaneous connection of external IDE devices and microSD cards is not allowed.

Figure 3.5: J21 IDC10 Pins Numbering



XP12 is 2 mm pitch 2-row IDC44 pin header (Leotronics 4446-3440). Its pinout is presented in the table below. Recommended counterpart is Leotronics 2040-3442 socket for ribbon cable or Leotronics 2067-2442 socket and 2066-2000 contacts set.

Table 3.2: XP12 Connector Pinout (IDE)

Pin#	Signal	Pin#	Signal	Pin#	Signal	Pin#	Signal
1	/RESET	12	DD12	23	/IOW	34	–
2	GND	13	DD2	24	GND	35	DA0
3	DD7	14	DD13	25	/IOR	36	DA2
4	DD8	15	DD1	26	GND	37	/CS1
5	DD6	16	DD14	27	/IOCHRDY	38	/CS3
6	DD9	17	DD0	28	GND	39	DASP
7	DD5	18	DD15	29	/DACK	40	GND
8	DD10	19	GND	30	GND	41	+5V
9	DD4	20	–	31	IRQ	42	+5V
10	DD11	21	DRQ	32	/CS16	43	GND
11	DD3	22	GND	33	DA1	44	–

The ACS00010 (FC44) cable allows direct connection of a 2.5" HDD to the XP12 connector. Other IDE devices (3.5" HDD, CD-ROM) having 40-contact 2.5 mm pitch connector can be connected to CPC307 via the CDM02 (469535.023) adapter. This adapter is plugged directly to the 40-contact connector of the IDE device, and with ACS00010 cable is connected to XP12 connector of CPC307.

The operation modes of external IDE devices are set using jumpers on these devices.

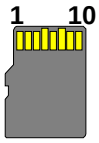
3.2.4 MicroSD

Two microSD cards can be connected to CPC307-04 using XS3 (channel 0) and XS4 (channel 1) sockets on the bottom side (Hirose DM3B-DSF-PEJ).

Important:

Before connecting microSD cards to CPC307-04 make sure that no external devices are connected to XP12 header and “SD” mode is selected for Primary IDE in BIOS Setup. Simultaneous connection of external IDE devices and microSD cards is not allowed.

Figure 3.6: MicroSD Cards Contacts Numbering



Only microSD и microSDHC formats are supported.

The pinout of the XS3 and XS4 sockets is presented in the following table.

Table 3.3: XS3 and XS4 MicroSD Sockets Pinout

Pin #	Function	Pin #	Function
1	DAT2	6	GND
2	CD/DAT3	7	DAT0
3	CMD	8	DAT1
4	VCC (+3.3V)	9	CDSwA
5	CLK	10	CDSwB (GND)

3.2.5 ATA Flash Disk

CPC307 has ATA flash disk controller connected to Primary IDE interface. The capacity of the soldered on-board NAND flash memory chip is 1 GB (except for CPC30704). The system detects this controller as an IDE disk which can be used as bootable. NAND flash disk contains the preinstalled FDOS 6.22 operating system compatible with MS DOS 6.22 and some software utilities providing operational availability of the module.

Closing contacts 1-2 of XP22 sets master mode for the controller; slave mode is set by removing jumper from these contacts. The controller can be disabled in BIOS Setup or by closing contacts 2-3 of XP22.

3.2.6 PS/2 Keyboard and Mouse Interface

PS/2 keyboard and mouse interface is routed to XP21 6-pin 2 mm pitch header (PLS2-40/6).

Figure 3.7: XP21 Connector Contacts Numbering

To make a custom cable it is recommended to use as a counterpart connector Leotronics 2065-2061 socket with 2066-2000 contacts.

The following table shows pinout of CPC307 XP21 connector.

Table 3.4: XP21 Contacts Designation

Pin Number	Signal	Pin Number	Signal
1	KBD CLK	4	GND
2	KBD DATA	5	+5V
3	MOUSE CLK	6	MOUSE DATA

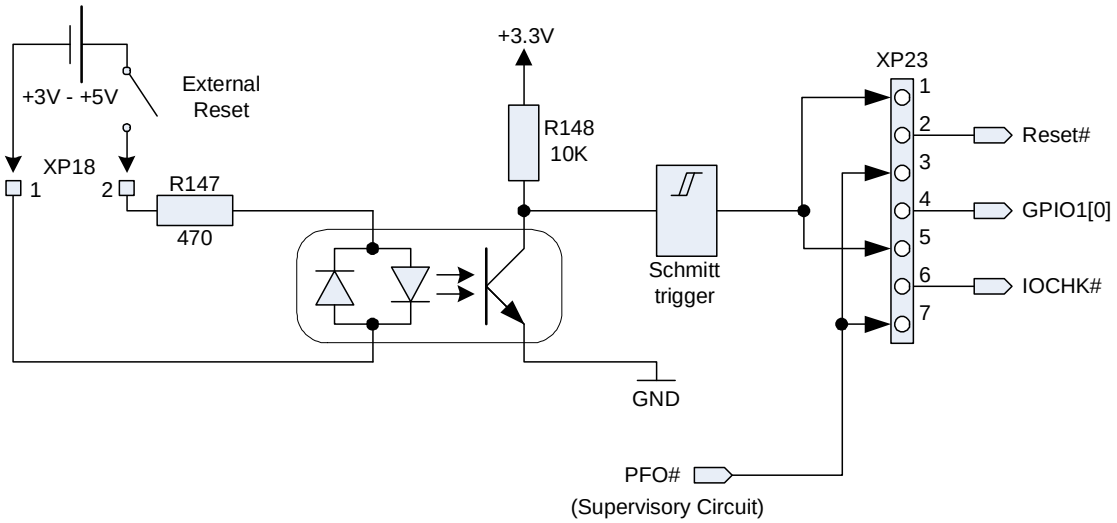
3.2.7 Optoisolated Reset/IRQ Input

Figure 3.8: XP18 Connector

XP18 is a 2-pin 2 mm pitch header (JST B 2B-PH-KL) that is intended for connection of a remote Reset/IRQ signal source with voltage of 3 to 5 V. The discrete input has 500 V optoisolation.

Recommended counterpart is JST PHR-2 socket and SPH-002T-P0.5S contacts for crimping.

Figure 3.9: Discrete Input Optoisolation and Reset or IRQ Source Selection



Depending on position of jumpers of XP23 pin header, the input is connected to different circuits:

- Closing contacts 1-2 of XP23 enables Reset on input;
- Closing contacts 4-5 of XP23 connects input to line 0 of GPIO1 port. Selection Reset function or IRQ line number is possible in BIOS Setup utility or by programming registers of GPIO1 port.
- Closing contacts 5-6 of XP23 enables NMI interrupt generation on input. This position of jumper connects the input to IOCHK# line of ISA bus.

XP23 pinpad also allows to set function of PFO# signal (Power Fail Output) from Power voltage supervisor chip. PFO# signal is set to “0” on +5V voltage drop down to +4.75V. PFO# signal is connected to the following circuits:

- Closing contacts 2-3 of XP23 enables Reset on active PFO# level;
- Closing contacts 3-4 of XP23 connects PFO# to line 0 of GPIO1 port. Selection Reset function or IRQ line number on PFO# is possible in BIOS Setup utility or by programming registers of GPIO1 port.
- Closing contacts 6-7 of XP23 enables NMI interrupt generation on PFO#. This position of jumper connects PFO# signal to IOCHK# line of ISA bus.

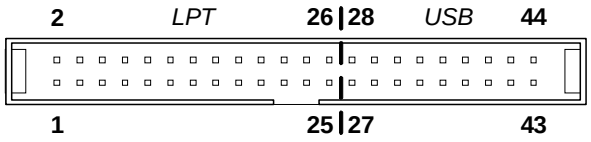
See also *TBA*.

3.2.8 USB Interface

The module is equipped with four USB 2.0 host ports routed to part of XP11 header contacts. Operation mode is selected in BIOS Setup. Each channel has separate power control and protection circuit (+5V, 500 mA). One USB device may be connected to each port. USB drive boot is supported.

XP11 is a 2-row pin header (Leotronics 2073-3442) with 2 mm pitch.

Figure 3.10: XP11 Connector



USB devices can be connected to XP11 header using a custom adaptor cable with Leotronics 2040-3442 socket for ribbon cable or Leotronics 2067-2202 socket with 2066-2000 contacts.

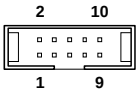
Table 3.5: XP11 Connector Pinout (USB)

Pin Number	Signal	Pin Number	Signal
27	+5V (USB1)	28	+5V (USB2)
29	D1-	30	D2-
31	D1+	32	D2+
33	GND (USB1)	34	GND (USB2)
35	–	36	–
37	+5V (USB3)	38	+5V (USB4)
39	D3-	40	D4-
41	D3+	42	D4+
43	GND (USB3)	44	GND (USB4)

3.2.9 Fast Ethernet Interface

One Fast Ethernet channel is available via XP8 connector on all versions of CPC307 except CPC30701. Ethernet controller is integrated in Vortex86DX SoC.

Figure 3.11: XP8 Connector



XP8 is a 2-row 2 mm pitch IDC10 header (Leotronics 2073-3102).

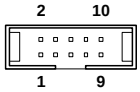
Recommended counterpart – 2040-3442 socket for ribbon cable or Leotronics 2067-2102 socket with 2066-2000 contacts.

Table 3.6: XP8 Ethernet Header Pinout

Pin Number	Signal	Pin Number	Signal
1	LAN1_TX+	6	NC
2	LAN1_TX-	7	NC
3	LAN1_RX+	8	NC
4	LAN1_RX-	9	NC
5	NC	10	NC

3.2.10 Serial Ports

Figure 3.12: IDC10 Pins Numbering



The CPC307 is furnished with six serial ports (CPC30703 with four).

3.2.10.1 COM1 and COM2

COM1 and COM2 ports operate in RS232 or RS485/422 modes and have standard PC AT base addresses. IRQ line and base address selection is performed in BIOS Setup. The operation mode for each port is set independently in BIOS Setup or via GPIO2 port. By default for RS232 mode is set COM1 and COM2.

Maximum transmission rate for these ports is 115.2 Kbaud; these ports are fully compatible with UART16550.

In RS485/422 mode transmitters are hardware controlled.

RS232 Mode

In RS232 mode the ports operate as complete 9-wire interface. RS232 mode is enabled for COM1 by setting line 0 of GPIO2 port to “1” and the line direction to “output”; for COM2 – by setting line 2 of GPIO2 port to “1” and the line direction to “output”.

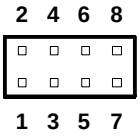
RS485/422 Mode

In RS485/422 mode transmitter is hardware controlled and receiver is constantly “on”.

In RS485 mode (half duplex operation of RS485/422 converter) the lines TX+ and RX+ are connected in the driver, as well as TX- and RX- lines at the side of interface connector. In RS422 mode these lines are not connected and routed to the connector separately.

RS485 mode is enabled for COM1 by setting line 1 of GPIO2 port to “1”; for COM2 – by setting line 3 of GPIO2 port to “1”. RS422 mode is enabled for COM1 by setting line 1 of GPIO2 port to “0”; for COM2 – by setting line 3 of GPIO2 port to “0”. Line direction for lines 1 and 3 should be set to “output”.

Figure 3.13: XP17 Pinpad



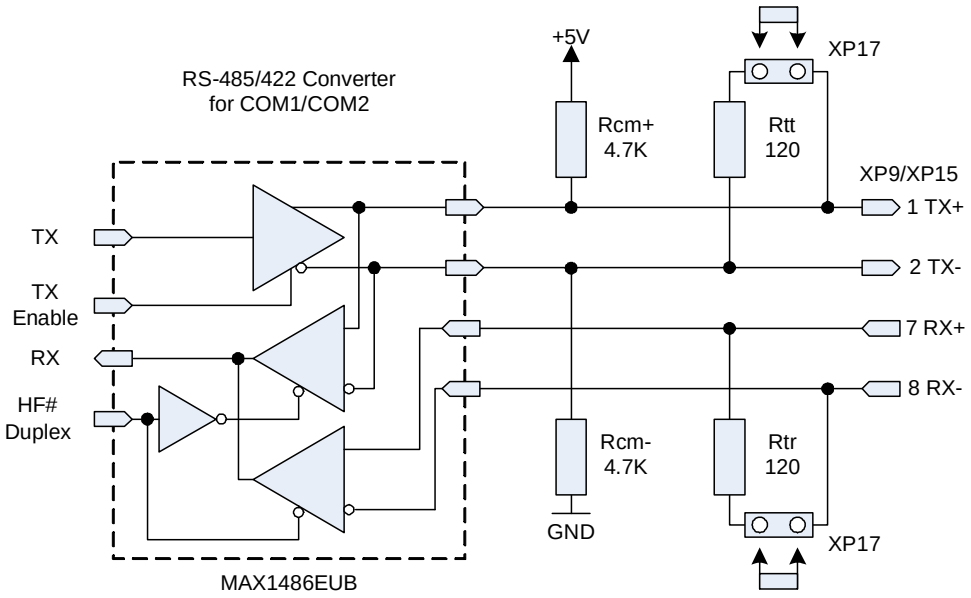
120 (±5%) Ohm terminating resistors for RS485/422 modes can be connected by setting appropriate jumpers on XP17 pinpad.

Table 3.7: XP17 Pinpad Jumpers

Closed Contacts	Connected Resistors
1-2	Rtt for TX-/TX+ lines of COM1
3-4	Rtr for RX-/RX+ lines of COM1
5-6	Rtt for TX-/TX+ lines of COM2
7-8	Rtr for RX-/RX+ lines of COM2

(Text TBA)

Figure 3.14: RS485/422 Transmitter with Shift Elements and Terminating Resistors



COM1 and COM2 are routed to XP9 and XP15 connectors respectively (IDC10, 2-row, 2 mm pitch connectors, Leotronics 2073-3102). Recommended counterparts are Leotronics 2040-3102 socket for ribbon cable or Leotronics 2067-2102 socket with 2066-2000 contacts.

Important:

+5V lines are protected by 0.5A self-resettable switch. Recommended consumption current for connected external modules is 0.4A. It is not recommended to power more than one external module via interface connectors in order not to overload power circuits of CPC307.

The following table shows pins designation for XP9 and XP15 headers.

Table 3.8: XP9 and XP15 Pin Assignments

Pin #	Signal		Pin #	Signal	
1	DCD	(RS-232)	2	DSR	(RS-232)
	TX+	(RS-422/485)		TX-	(RS-422/485)
3	RXD#		4	RTS	
5	TXD#		6	CTS	
7	DTR	(RS-232)	8	RI	(RS-232)
	RX+	(RS-422/485)		RX-	(RS-422/485)
9	GND		10	+5V	

Figure 3.15: Connection of Several Devices in RS422 Mode

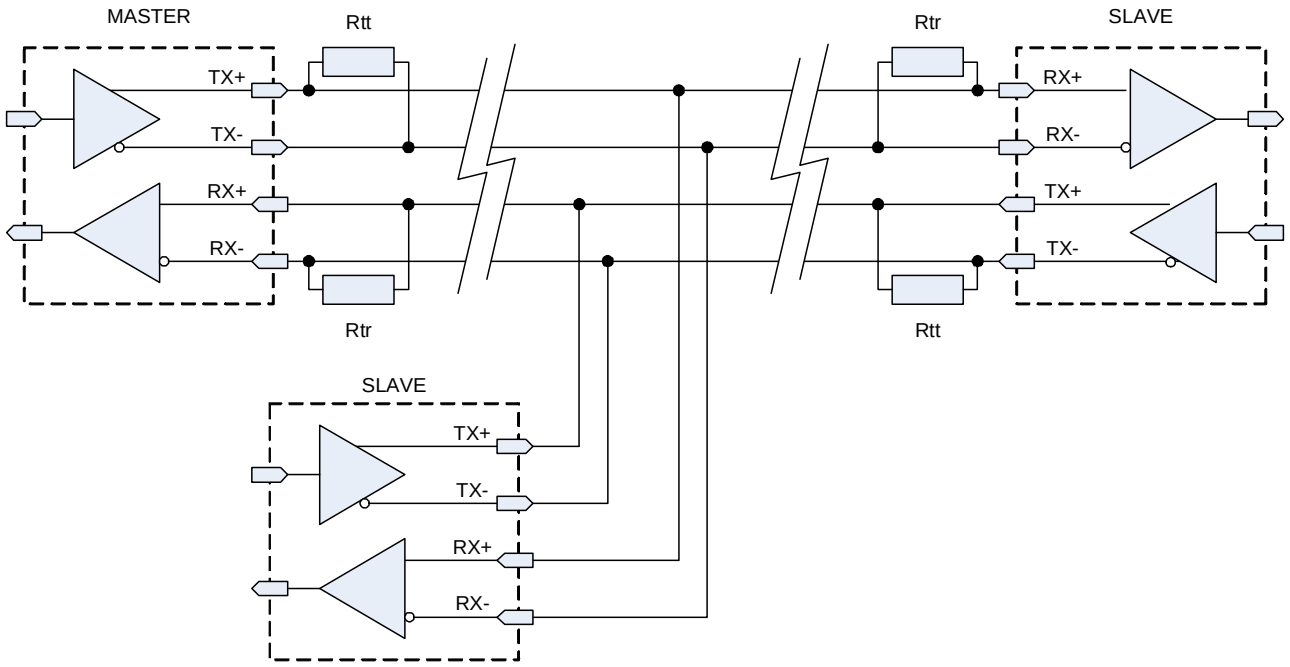
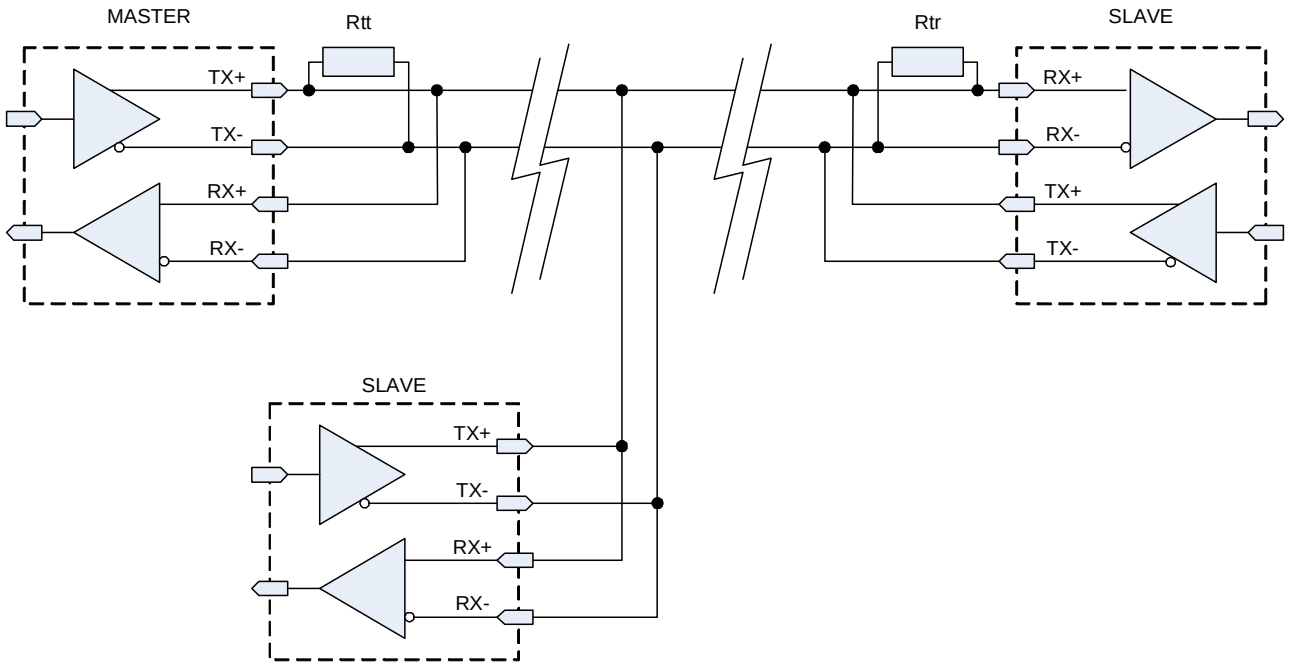


Figure 3.16: Connection of Several Devices in RS485 Mode



3.2.10.2 COM3 and COM4

COM3 (XP5) and COM4 (XP6) ports operate in 9-wire RS232 mode and have standard PC AT base addresses. IRQ line and base address selection is performed in BIOS Setup. Maximum transmission rate for these ports is 115.2 Kbaud; they are fully compatible with UART16550.

Both connectors are 2-row, 2 mm pitch pin headers (Leotronics 2073-3102). Recommended counterparts are Leotronics 2040-3102 socket for ribbon cable or Leotronics 2067-2102 socket with 2066-2000 contacts.

Important:

+5V lines are protected by 0.5A self-resettable switch. Recommended consumption current for connected external modules is 0.4A. It is not recommended to power more than one external module via interface connectors in order not to overload power circuits of CPC307.

Table 3.9: XP5 and XP6 Pin Assignments

Pin #	Signal	Pin #	Signal
1	DCD	2	DSR
3	RXD#	4	RTS
5	TXD#	6	CTS
7	DTR	8	RI
9	GND	10	+5V

3.2.10.3 COM5 and COM6

COM5 and COM6 ports operate in RS422 mode. Base addresses (BA) selection is performed by programming the Vortex86DX registers. Interrupt lines are set by hardware. For details see Integrated Address Decoder section (*TBA*) of this document.

Maximum transmission rate for these ports is 3.6 Mbaud; they are fully compatible with UART16550.

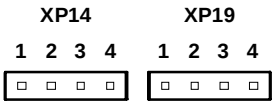
Table 3.10: COM5 and COM6 Controllers Resources

	COM5	COM6
Control area	BA+0x00 – BA+ 0x07	BA+0x08 – BA+ 0x0F
ISA interrupt lines	IRQ7	IRQ9

Operation mode for each port is set by programming the registers of EXAR XR16C2850IM controller. Transmitters in RS485/422 mode are hardware controlled.

To enable RS485 interface, the lines TX+ and RX+, as well as TX- and RX- should be connected at XP16 connector.

Figure 3.17: XP14 and XP19 Pinpads



120 (±5%) Ohm terminating resistors for RS485/422 modes can be connected by setting appropriate jumpers on XP14 and XP19 pinpads.

Table 3.11: XP14 and XP19 Pinpads Jumpers

Closed Contacts	Connected Resistors
XP14: 1-2	Rtt for TX-/TX+ lines of COM5
XP14: 3-4	Rtr for RX-/RX+ lines of COM5
XP19: 1-2	Rtt for TX-/TX+ lines of COM6
XP19: 3-4	Rtr for RX-/RX+ lines of COM6

Text TBA

COM5 and COM6 are routed to XP16 2-row, 2 mm pitch pin header (Leotronics 2073-3102). Recommended counterparts are Leotronics 2040-3102 socket for ribbon cable or Leotronics 2067-2102 socket with 2066-2000 contacts. The pinout of XP16 is presented in a table below.

Figure 3.18: Transmitter with Protective Shift Elements and Terminating Resistors

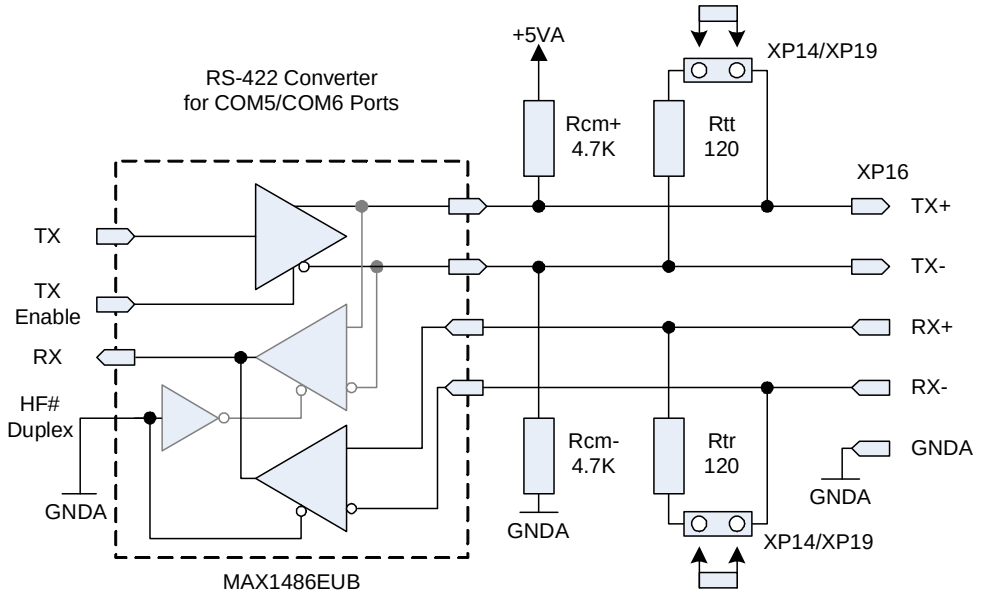


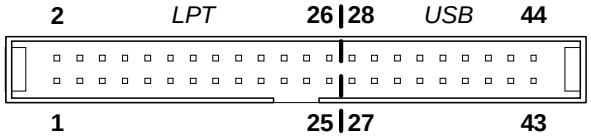
Table 3.12: XP16 Pin Assignments (COM5 and COM6)

Pin #	Signal	Pin #	Signal
1	TX+ (COM5)	2	TX- (COM5)
3	RX+ (COM5)	4	RX- (COM5)
5	GND (COM5)	6	TX+ (COM6)
7	TX- (COM6)	8	RX+ (COM6)
9	RX- (COM6)	10	GND (COM6)

3.2.11 Parallel Printer Port (LPT)

LPT port is available via first 26 contacts of XP11 2-row 2 mm pitch connector (Leotronics 2073-3442). LPT port of CPC307 supports SPP, EPP, and ECP operation modes and has standard PC/AT base addresses. Base address and interrupt line are selected in BIOS Setup.

Figure 3.19: XP11 Connector



Recommended counterpart connector for making a custom adaptor cable is Leotronics 2040-3442 socket for ribbon cable or Leotronics 2067-2442 socket with 2066-2000 contacts.

Important:

+5V lines are protected by 0.5A self-resettable switch. Recommended consumption current for connected external modules is 0.4A. It is not recommended to power more than one external module via interface connectors in order not to overload power circuits of CPC307.

The table below describes pin assignments of LPT part of XP11 connector.

Table 3.13: XP11 (LPT) Connector Pinout

Pin #	Signal	Pin #	Signal
1	STB#	2	AFD#
3	PD0	4	ERR#
5	PD1	6	INIT#
7	PD2	8	SLIN#
9	PD3	10	GND
11	PD4	12	GND
13	PD5	14	GND
15	PD6	16	GND
17	PD7	18	GND
19	ACK#	20	GND
21	BUSY	22	GND
23	PE	24	GND
25	SLCT	26	+5V

3.2.12 Expansion Buses: ISA and PCI

The module is equipped with two interface expansion headers stipulated by PC/104-Plus specification – 104-pin ISA and 120-pin PCI (except for CPC30701) connectors. They allow stacking up to four PC/104-Plus modules. Up to three PC/104-Plus PCI-master expansion modules are supported. Both connectors are available as a socket at the top side of the module and as a pin array with organizer at the bottom side of CPC307.

3.2.12.1 PCI Header

PC/104-Plus standard specifies availability of 120-pin (30x4) 2 mm header. This interface header accepts up to 3 stackable PC/104-Plus PCI bus mastering modules and carries all of the appropriate 32-bit 33 MHz PCI signals. PCI signals are available both via the socket at the top side of the module (XS1, AMP 1375799-1) and via a pin array with organizer (AMP 1375801-1) at the bottom side of CPC307.

XS1 contacts designation and load capacity (LC) are shown in the following table.

Figure 3.20: XS1 Connector Contacts Layout

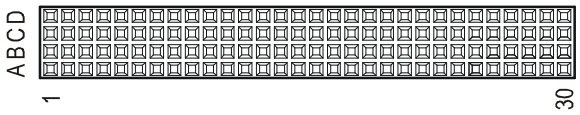


Table 3.14: XS1 Connector Contacts Designation (Rows A, B)

Pin	Signal	State	LC, mA	Pin	Signal	State	LC, mA
A1	GND	Power	–	B1	–	–	–
A2	VI/O	+3.3V (Out)	–	B2	AD2	In / Out	12
A3	AD5	In / Out	12	B3	GND	Power	–
A4	C/BE0#	In / Out	12	B4	AD7	In / Out	12
A5	GND	Power	–	B5	AD9	In / Out	12
A6	AD11	In / Out	12	B6	VI/O	+3.3V (Out)	–
A7	AD14	In / Out	12	B7	AD13	In / Out	12
A8	–	–	–	B8	C/BE1#	In / Out	12
A9	SERR#	PU (10K)	–	B9	GND	Power	–
A10	GND	Power	–	B10	PERR#	PU (10K)	–
A11	STOP#	In / Out	12	B11	–	–	–
A12	–	–	–	B12	TRDY#	In / Out	12
A13	FRAME#	In / Out	12	B13	GND	–	–
A14	GND	Power	–	B14	AD16	In / Out	12
A15	AD18	In / Out	12	B15	–	–	–
A16	AD21	In / Out	12	B16	AD20	In / Out	12
A17	–	–	–	B17	AD23	In / Out	12
A18	IDSEL0	AD12	–	B18	GND	Power	–
A19	AD24	In / Out	12	B19	C/BE3#	In / Out	
A20	GND	Power	–	B20	AD26	In / Out	12
A21	AD29	In / Out	12	B21	+5V	Power	–

Pin	Signal	State	LC, mA	Pin	Signal	State	LC, mA
A22	+5V	Power	–	B22	AD30	In / Out	12
A23	REQ0#	In	–	B23	GND	Power	–
A24	GND	Power	–	B24	REQ2#	In	–
A25	GNT1#	Out	12	B25	VI/O	+3.3V (Out)	–
A26	+5V	Power	–	B26	CLK0	Out	12
A27	CLK2	Out	6	B27	+5V	In	–
A28	GND	Power	–	B28	INTD#	In	–
A29	+12V	–	–	B29	INTA#	In	–
A30	-12V	–	–	B30	–	–	–

LC – Load Capacity

Table 3.15: XS1 Connector Contacts Designation (Rows C, D)

Pin	Signal	State	LC, mA	Pin	Signal	State	LC, mA
C1	+5V	Power	–	D1	AD0	In / Out	12
C2	AD1	In / Out	12	D2	+5V	Power	–
C3	AD4	In / Out	12	D3	AD3	In / Out	12
C4	GND	Power	–	D4	AD6	In / Out	12
C5	AD8	In / Out	12	D5	GND	Power	–
C6	AD10	In / Out	12	D6	M66EN (GND)	–	–
C7	GND	Power	–	D7	AD12	In / Out	12
C8	AD15	In / Out	12	D8	–	–	–
C9	–	–	–	D9	PAR	In / Out	12
C10	–	–	–	D10	–	–	–
C11	LOCK#	PU (10K)	–	D11	GND	Power	–
C12	GND	Power	–	D12	DEVSEL#	In / Out	12
C13	IRDY#	In / Out	12	D13	–	–	–
C14	–	–	–	D14	C/BE2#	In / Out	12
C15	AD17	In / Out	12	D15	GND	Power	–
C16	GND	Power	–	D16	AD19	In / Out	12
C17	AD22	In / Out	12	D17	–	–	–
C18	IDSEL1	AD13	–	D18	IDSEL2	AD14	–
C19	VI/O	+3.3V (Out)	–	D19	IDSEL3	AD15	–
C20	AD25	In / Out	12	D20	GND	Power	–
C21	AD28	In / Out	12	D21	AD27	In / Out	12
C22	GND	Power	–	D22	AD31	In / Out	12
C23	REQ1#	In	–	D23	VI/O	+3.3V (Out)	–
C24	+5V	Power	–	D24	GNT0#	Out	12
C25	GNT2#	Out	12	D25	GND	Power	–
C26	GND	Power	–	D26	CLK1	Out	12
C27	CLK3	Out	6	D27	GND	Power	–
C28	+5V	Power	–	D28	RST#	Out	12
C29	INTB#	In	–	D29	INTC#	In	–
C30	GNT3#	PU (10K)	–	D30	GND	Power	–

LC – Load Capacity

Note:

In two tables above:
"–" – Not used;
"Power" – supplied to the stacked modules
In/Out column shows the data transfer direction for a processor module being the bus master.

3.2.12.2 ISA Header

XS2 header mounted on CPC307 allows connection of PC/104 expansion modules via ISA bus (8/16-bit, 8.3/16.6 MHz, DMA support). ISA signals are available both via the socket at the top side of the module (AMP 1375795-2) and via a pin array with organizer (AMP 1445251-1) at the bottom side of CPC307.

The contact configuration of XS2 header is shown in the figure below. The tables following the figure presents the designation of its contacts and load capacity.

Figure 3.21: ISA Header Contacts Layout

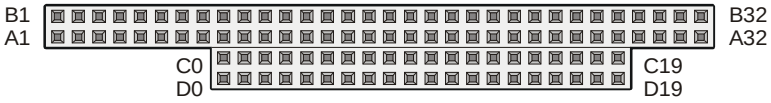


Table 3.16: ISA XS2 Connector (Rows A and B) Contacts Designation

Pin #	Signal	In/Out	LC, mA	Pin #	Signal	In/Out	LC, mA
A1	/IOCHK	–	–	B1	GND	Power	–
A2	SD7	In/Out	16	B2	RESET	Out	16
A3	SD6	In/Out	16	B3	+5V	Power	–
A4	SD5	In/Out	16	B4	IRQ9	In	–
A5	SD4	In/Out	16	B5	-5V	Power	–
A6	SD3	In/Out	16	B6	DRQ2	In	–
A7	SD2	In/Out	16	B7	-12V	Power	–
A8	SD1	In/Out	16	B8	0WS	In	–
A9	SD0	In/Out	16	B9	+12V	Power	–
A10	IOCHRDY	In	16	B10	GND	Power	–
A11	AEN	Out	16	B11	/SMEMW	Out	16
A12	SA19	Out	16	B12	/SMEMR	Out	16
A13	SA18	Out	16	B13	/IOW	Out	16
A14	SA17	Out	16	B14	/IOR	Out	16
A15	SA16	Out	16	B15	/DACK3	Out	8
A16	SA15	Out	16	B16	DRQ3	In	–
A17	SA14	Out	16	B17	/DACK1	Out	8
A18	SA13	Out	16	B18	DRQ1	In	–

Pin #	Signal	In/Out	LC, mA	Pin #	Signal	In/Out	LC, mA
A19	SA12	Out	16	B19	/REFRESH	Out	8
A20	SA11	Out	16	B20	BCLK	Out	8
A21	SA10	Out	16	B21	IRQ7	In	–
A22	SA9	Out	16	B22	IRQ6	In	–
A23	SA8	Out	16	B23	IRQ5	In	–
A24	SA7	Out	16	B24	IRQ4	In	–
A25	SA6	Out	16	B25	IRQ3	In	–
A26	SA5	Out	16	B26	/DACK2	Out	8
A27	SA4	Out	16	B27	TC	Out	8
A28	SA3	Out	16	B28	BALE	Out	16
A29	SA2	Out	16	B29	+5V	Power	–
A30	SA1	Out	16	B30	OSC	Out	16
A31	SA0	Out	16	B31	GND	Power	–
A32	GND	Power	–	B32	GND	Power	–

Table 3.17: ISA XS2 (Rows C and D) Contacts Designation

Pin #	Signal	In/Out	LC, mA	Pin #	Signal	In/Out	LC, mA
C0	GND	Power	–	D0	GND	Power	–
C1	/SBHE	Out	8	D1	/MEMCS16	In	8
C2	LA23	Out	8	D2	/IOCS16	In	8
C3	LA22	Out	8	D3	IRQ10	In	–
C4	LA21	Out	8	D4	IRQ11	In	–
C5	LA20	Out	8	D5	IRQ12	In	–
C6	LA19	Out	8	D6	IRQ13	In	–
C7	LA18	Out	8	D7	IRQ14	In	–
C8	LA17	Out	8	D8	/DACK0	Out	8
C9	/MEMR	Out	16	D9	DRQ0	In	–
C10	/MEMW	Out	16	D10	/DACK5	Out	8
C11	SD8	In/Out	16	D11	DRQ5	In	–
C12	SD9	In/Out	16	D12	/DACK6	Out	8
C13	SD10	In/Out	16	D13	DRQ6	In	–
C14	SD11	In/Out	16	D14	/DACK7	Out	8
C15	SD12	In/Out	16	D15	DRQ7	In	–
C16	SD13	In/Out	16	D16	+5V	Power	–
C17	SD14	In/Out	16	D17	/MASTER	In	–
C18	SD15	In/Out	16	D18	GND	Power	–
C19	KEY	–	–	D19	GND	Power	–

Note:

In two tables above:
"–" – Not used;
"Power" – supplied to the stacked modules
In/Out column shows the data transfer direction for a processor module being the bus master.

3.2.13 Redundancy

CPC307 supports redundancy connection. To do so, connect the main and the reserve modules in PC/104 stack with no connection via XS1 (PCI) connector. Make connection between XP1 and XP10 pinpads according to the figure below.

Additional information on redundancy arrangement is available upon request.

Figure 3.22: Redundancy Pinpads Connection

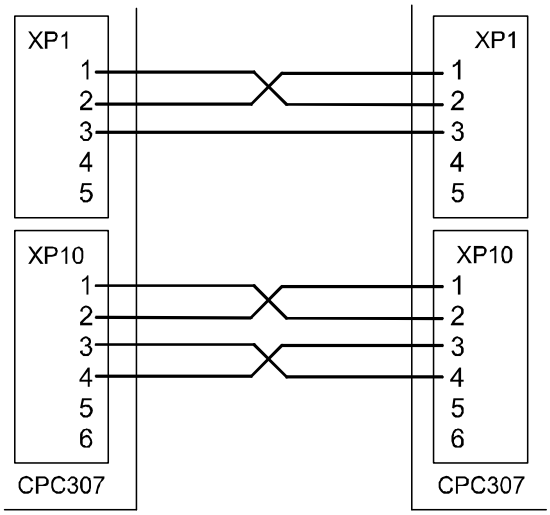


Figure 3.23: XP10 Pinpad

XP10 is a 1-row 6-pin 2 mm pitch pinpad (PLS2-40/6).

Recommended counterpart: 2065-2061 socket with 2066-2000 contacts.

Table 3.18: XP10 Pinout

Pin	Signal	Pin	Signal
1	Fail_out#	4	GPCS0#
2	Fail_in#	5	Sw_in#
3	GPCS_in#	6	GPCS1#

3.2.14 RTC and CMOS + Serial FRAM

Two independent CAN 2.0b interfaces of CPC307 are based on SJA1000T controllers. Both controllers can be reset by software. Base address (BA) selection is performed by programming registers of Vortex86DX SoC. Interrupt lines are hardware defined.

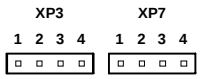
Maximum transmission rate for CAN1 and CAN2 ports is 1 Mbit/s. Both ports have 500 V isolation.

Table 3.19: CAN Controllers Addresses

	CAN1	CAN2
Control area	BA+0x000 – BA+ 0x0FF	BA+0x200 – BA+ 0x2FF
Reset area (accessing these addresses leads to controller Reset)	BA+0x100 – BA+ 0x1FF	BA+0x300 – BA+ 0x3FF
ISA bus interrupt line	IRQ10	IRQ11

Details of addressing are available in Addressing section (*TBA*) of this document.

Figure 3.24: XP3 and XP7 Pinpads

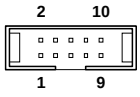


120 (±5%) Ohm terminating resistors for CANL/CANH lines can be connected by setting appropriate jumpers on XP3 and XP7 pinpads. These pinpads are used also to enable the high-speed driver operation.

Table 3.20: XP3 and XP7 Pinpads Jumpers

Closed Contacts	Connected Resistors
XP3: 1-2	High-speed mode enabled for CAN1
XP3: 3-4	Rt for CANL/CANH line of CAN1
XP7: 1-2	High-speed mode enabled for CAN2
XP7: 3-4	Rt for CANL/CANH line of CAN1

Figure 3.25: XP4 Pins Numbering (CAN)



CAN1 and CAN2 are routed to XP4 header (IDC10, 2-row, 2 mm pitch, Leotronics 2073-3102). Recommended counterpart is Leotronics 2040-3102 socket for ribbon cable.

Table 3.21: XP4 Connector Pinout (CAN)

Pin	Signal	Pin	Signal
1	CANH (CAN1)	2	CANL (CAN1)
3	GND_CAN1	4	–
5	–	6	–
7	–	8	CANH (CAN2)
9	CANL (CAN2)	10	GND_CAN2

3.2.15 Watchdog Timers

CPC307 has three watchdog timers.

WDT0 and WDT1 have programmable timeout period from 30.5 μs to 512 seconds and are integrated in Vortex86DX SoC. WDT0 and WDT1 are controlled via internal processor registers. Description of these registers will be added later (*TBA*).

WDT2 has fixed timeout period of 1.6 seconds; it is integrated in ADM706T power supply supervisor chip. Expiry of its timeout period trigger special registers, which are available to BIOS function for reading after reboot. The fact of watchdog operation is also reflected by lighting HL3 green LED. WDT2 is controlled via GPIO1 port lines (1, 2, 3, 4) of Vortex86DX. WDT2 can be disabled by setting a jumper on XP25 pinpad. See also detailed description of GPIO ports in relevant subsection of this Manual (*TBA*).

3.2.16 RTC, CMOS, Serial FRAM and Reserved BIOS

3.2.16.1 Reserved BIOS

The CPC307 takes advantage of flash-memory based BIOS. The main (working) copy of BIOS occupies 512 KB on a soldered chip. Reserve BIOS copy occupies 256 KB of flash memory integrated in the controller and is used for emergency boot.

On power-up the module is booted using main BIOS copy, if XP24 jumper is removed. If XP24 is closed and and the timeout of WDT expired, the module boots using the reserve copy.

TO enable boot using the main BIOS copy, do one of the following:

- Reset the module by pressing the SW1 (RESET#) button;
- Reset the module by an external reset, contacts 1-2 of XP23 should be closed;
- Set the jumper or close the contacts 1-2 of XP26 for a short time and then reset the module;
- Set the GPIO1 port line 3 to “0” and then reset the module;
- Swith the power off. On power-up the module will boot using the main BIOS copy.

WDT timeout expiry and the reserve BIOS copy use can be indicated by a LED connected to contacts 5-6 of XP27.

BIOS settings can be changed only in BIOS Setup utility.

3.2.16.2 CMOS and Battery

The supplied with CPC307 3 V lithium battery (CR2032) is installed in X1 holder. It is used to power the RTC and CMOS memory when the system power is off. BIOS settings are duplicated to FRAM memory and automatically recovered in case of CMOS data loss. This allows using the module without battery; but system date and time are not stored in this case.

The capacity of the battery is 235 mA/h. The consumption current of the module in power-off state is about 2 μA. Expected life-time of the battery is about 10 years at 23°C, but it depends on operating or storage temperature and power off time. It is recommended to replace the battery every 5 years.

Replacing the battery, observe polarity: “+” is up.

Dispose of used batteries according to the local regulations.

3.2.16.3 FRAM

FRAM is non-volatile memory with SPI interface. It serves as a back-up storage for BIOS Setup parameters and for restoration of the RTC memory (except the time and date settings) if an error is detected. This feature enables the possibility to operate the module even when the battery is disconnected. High FRAM memory units (7 KB) are available to the user via INT17H BIOS extensions. The lower 1 KB of FRAM is reserved.

FRAM can be addressed direcly via SPI registers, for details, please refer to Vortex86DX and FRAM descriptions supplied on CD in ...\CPC307\Techinfo folder. A sample is available in …\CPC307\Software\SFRAM307.zip file on the CD.

(*TBA*)

3.2.16.4 BIOS Upgrade

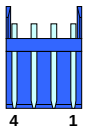
Reserved BIOS allows riskless upgrade of BIOS copies. Both the main and the reserve BIOS copies can be upgraded using the supplied with the module utilities.

(*TBA*)

3.2.17 Power Supply

The power is supplied to CPC307 via XS1 and XS2 connectors or via dedicated XP20 (AMP 4-171826-4) connector from an external power source.

Figure 3.26: XP20 Power Supply Connector



The main power voltage of the processor module is +5V ±5%. For stable operation of the module without external devices, the external power supply unit should provide not less than 1.2 A consumption current.

The following table gives assignments of XP20 contacts.

Table 3.22: XP20 Power Connector Pinout

Pin	Assignment
1	+5 V
2	GND
3	GND
4	–

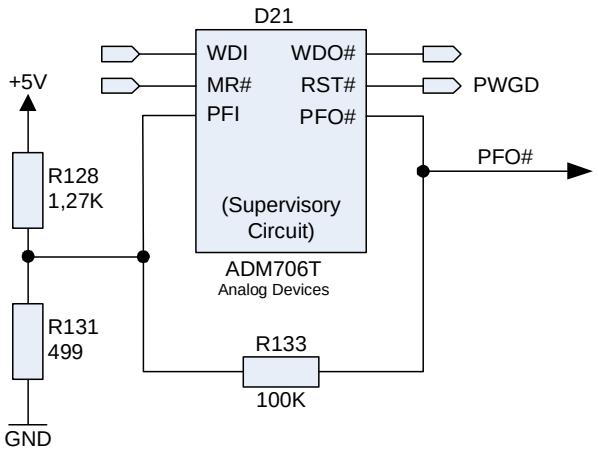
For making a custom power cable it is recommended to use AMP 4-171822-4 socket with 170262-1 contacts.

3.2.18 Power Supply Supervisor

CPC307 is equipped with ADM706T power supply supervisor. If during the operation +5V voltage drops below +4.45V, then PFO# signal is generated. This signal can be connected to different circuits using XP23 pinpad. If the voltage drops below +3.08V, then hardware Reset is issued.

(*TBA*)

Figure 3.27: Power Supply Supervisor Diagram



3.2.19 GPIO Ports

Vortex86DX SoC includes three general purpose I/O ports available via internal registers. Each port consists of 8 programmable input/output lines. (*TBA*)

GPIO1 is used for watchdog timer control, as well as for switching on/off the ATA flash disk controller. GPIO2 is used for COM1, COM2 ports control, for switching user LEDs, and for reading the SW1 state.

GPIO0 is available through XP13 (IDC10, 2-row, 2 mm pitch header; Leotronics 2073-3102). Recommended counterpart Leotronics 2040-3102 socket for ribbon cable.

(*TBA*)

3.2.20 Configuration Jumpers

XP3, XP7, XP14, XP17, XP19, XP22, XP23, XP25, XP26 jumpers description (*TBA*).

3.2.21 Diagnostic LEDs

CPC307 has three diagnostic LEDs (HL1, HL2, HL3). The following table describes the function of these LEDs.

Table 3.23: CPC307 Diagnostic LEDs Function

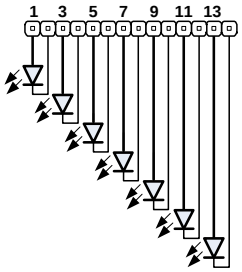
LED	Color	Function
HL1	Yellow	+5V presence
HL2	Green	User LED controlled via GPIO2[4] line
HL3	Green	User LED controlled via GPIO2[5] line

Moreover, XP27 connector is uded for connection of external LEDs.

Table 3.24: XP27 Contacts Function

Pins	Current	Function
1 – 2	R=510, U=+5V	Ethernet Link ACT
3 – 4	R=510, U=+5V	Ethernet Duplex
5 – 6	R=330, U=+1.8V	WDO ACT
7 – 8	R=330, U=+3.3V	CPU_RESET
9 – 10	R=510, U=+5V	IDE ACT
11 – 12	R=330, U=+3.3V	USER1 (GPIO2_5)
13 – 14	R=330, U=+3.3V	USER0 (GPIO2_4)

Figure 3.28: External LEDs Connection (XP27)



3.2.22 Reset Button

In the event of a contingency (module hang-up, for example) use the Reset button SW1 on the top side of the module to reset the system.

3.3 Address Mapping

3.3.1 Memory Addressing

Table 3.25: Memory Address Mapping

Address Range	Size	Description
00000h – 9FFFFh	640 Кбайт	System memory
A0000h – BFFFFh	128 Кбайт	PCI/ISA VGA Graphics
C0000h – C7FFFh	32 Кбайт	VGA BIOS
C8000h – CFFFFh	32 Кбайт	Expansion Card Boot ROM
D0000h - EFFFFh	128 Кбайт	Not used
F0000h – FFFFFh	64 Кбайт	BIOS

3.3.2 I/O Addressing

Table 3.26: I/O Address Space

Address Range	Function	Note
0000h – 001Fh	8237 DMA Controller #1	–
0020h – 0021h	8259 Master Interrupt Controller	–
0022h – 0023h	Indirect Access	WDT0
0024h – 002Dh	ISA bus	External bus access
002Eh – 002Fh	Reserved	No access
0030h – 003Fh	ISA bus	External bus access
0040h – 0043h	8253 Programmable Timer	–
0044h – 0047h	ISA bus	External bus access
0048h – 004Bh	Reserved	No access
004Eh – 005Fh	ISA bus	External bus access
0060h – 0064h	8042 Keyboard Controller	–
0065h	WDT0	–
0066h	ISA bus	External bus access
0067h – 006Dh	WDT1	–
006Eh – 006Fh	ISA bus	External bus access
0070h – 007Fh	RTC, NMI Mask Register	–
0080h – 009Fh	DMA Page Registers	–
00A0h – 00B1h	8259 Slave Interrupt Controller	–
00B2h – 00BFh	ISA bus	External bus access
00C0h – 00DFh	8237 DMA Controller #2	–
00E0h – 01EFh	ISA bus	External bus access
01F0h – 01F8h	Primary IDE Controller	–
01F9h – 0277h	ISA bus	External bus access

Address Range	Function	Note
0278h – 027Fh	Порт LPT	(possible designation)
0280h – 02E7h	ISA bus	External bus access
02E8h – 02EFh	Serial Port 4	(possible designation)
02F0h – 02F7h	ISA bus	External bus access
02F8h – 02FFh	Serial Port 2	(possible designation)
0300h – 0377h	ISA bus	External bus access
0378h – 037Fh	Порт LPT	(possible designation)
0380h – 03AFh	ISA bus	External bus access
03B0h – 03BBh	MDA Adapter	(possible designation)
03BCh – 03BFh	Порт LPT	(possible designation)
03C0h – 03CFh	EGA, VGA Adapter	(possible designation)
03D0h – 03DFh	CGA Adapter	(possible designation)
03E0h – 03E7h	ISA bus	External bus access
03E8h – 03EFh	Serial Port 3	(possible designation)
03F0h – 03F7h	Floppy Controller #1	(possible designation)
03F8h – 03FFh	Serial Port 1	(possible designation)
0400h – 04CFh	ISA bus	External bus access
04D0h – 04D1h	Reserved	No access
04D2h – 0777h	ISA bus	External bus access
0778h – 077Fh	Reserved	No access
0780h – 0CF7h	ISA bus	External bus access
0CF8h – 0CFFh	Host PCI controller configuration registers	–
0D00h – EDFFh	ISA bus	External bus access
EE00h – EF3Fh	Reserved	No access
EF40h – FBFFh	ISA bus	External bus access
FC00h – FC0Dh	Reserved	No access
FC0Eh – FFEFh	ISA bus	External bus access
FFF0h – FFFFh	Reserved	No access

3.3.3 Integrated Address Decoder

Two SJA1000T CAN controllers and the controller of two RS232 ports (XR16C2850IM) require base addresses and address ranges to be set before use. For addressing these controllers two integrated in Vortex86DX address decoders are used: GPCS0 and GPCS1 (General Purpose Chip Select) lines.

(*TBA*)

3.3.3.1 CAN Ports Addresses

(*TBA*)

3.3.3.2 COM Ports Addresses

(*TBA*)

3.3.4 Interrupt settings

By default, interrupts are generated by the devices belonging to the CPC307 module. The table below presents interrupt settings. Interrupt request configuration is performed in BIOS Setup.

Table 3.27: Interrupt Settings

System Units		NMI	IRQ Lines														
			0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
System timer			●															
PS/2 keyboard				●														
PS/2 мышь															●			
Cascading					●													
COM 1						○	●					○	○	○				
COM 2						●	○					○	○	○				
COM 3						○	●					○	○	○				
COM 4						●	○					○	○	○				
COM 5										●								
COM 6												●						
CAN 1													●					
CAN 2														●				
LPT								●		○								
RTC											●							
Ethernet																		●
USB										●		●	●	●				
Co-Processor																●		
IDE (Primary Channel)																	●	
WDT0		○				○	○	○	○	○		○	○	○	○		○	○
WDT1		○				○	○	○	○	○		○	○	○	○		○	○
WDT2		o				○	○	○	○	○		○	○	○	○		○	○
External isolated interrupt		o				○	○	○	○	○		○	○	○	○		○	○
PC104		o				○	○	○	○	○		○	○	○	○		○	○
PCI104	INT A					○	○	○	○	○		○	○	○	○		○	○
	INT B					○	○	○	○	○		○	○	○	○		○	○
	INT C					○	○	○	○	○		○	○	○	○		○	○
	INT D					○	○	○	○	○		○	○	○	○		○	○

Legend:

	Not allowed
○	Possible
●	Default
o	Via IOCHK# signal of ISA bus

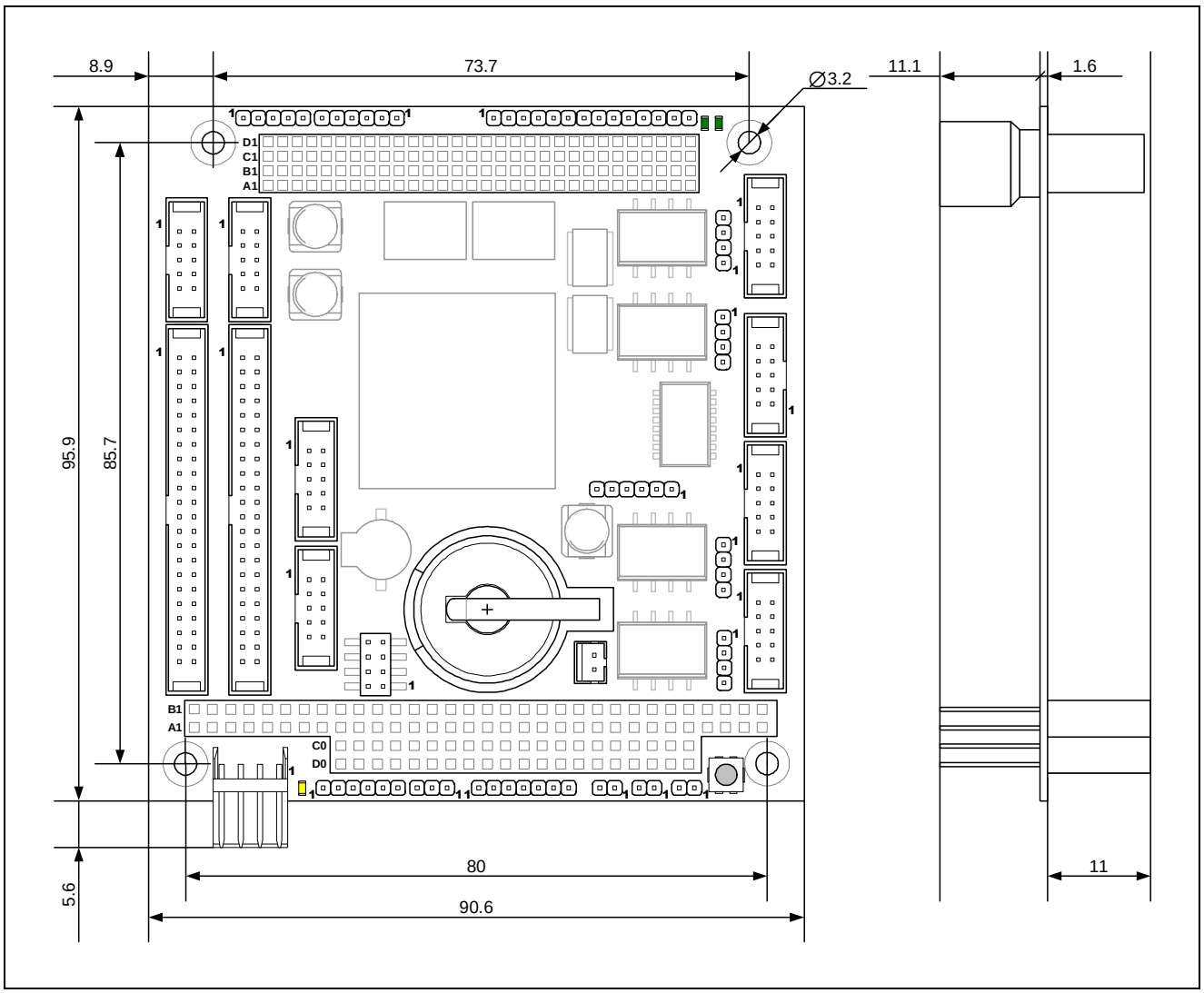
(*TBA*)

3.3.5 DMA Channels

(*TBA*)

3.4 Overall and Mounting Dimensions

Figure 3.29: CPC307: Overall and Mounting Dimensions



4 External Connections

The following precautions must be observed to ensure proper installation and to avoid damage to the module, other system components, or harm to personnel.

4.1 Safety Regulations

The following safety regulations must be observed when installing or operating the module. Fastwel assumes no responsibility for any damage resulting from infringement of these rules.

Warning!

When handling or operating the module, special attention should be paid to the heatsink, because it can get very hot during operation. Do not touch the heatsink when installing or removing the module.

Moreover, the module should not be placed on any surface or in any kind of package until the module and its heatsink have cooled down to ambient temperature.

ESD Sensitive Equipment!

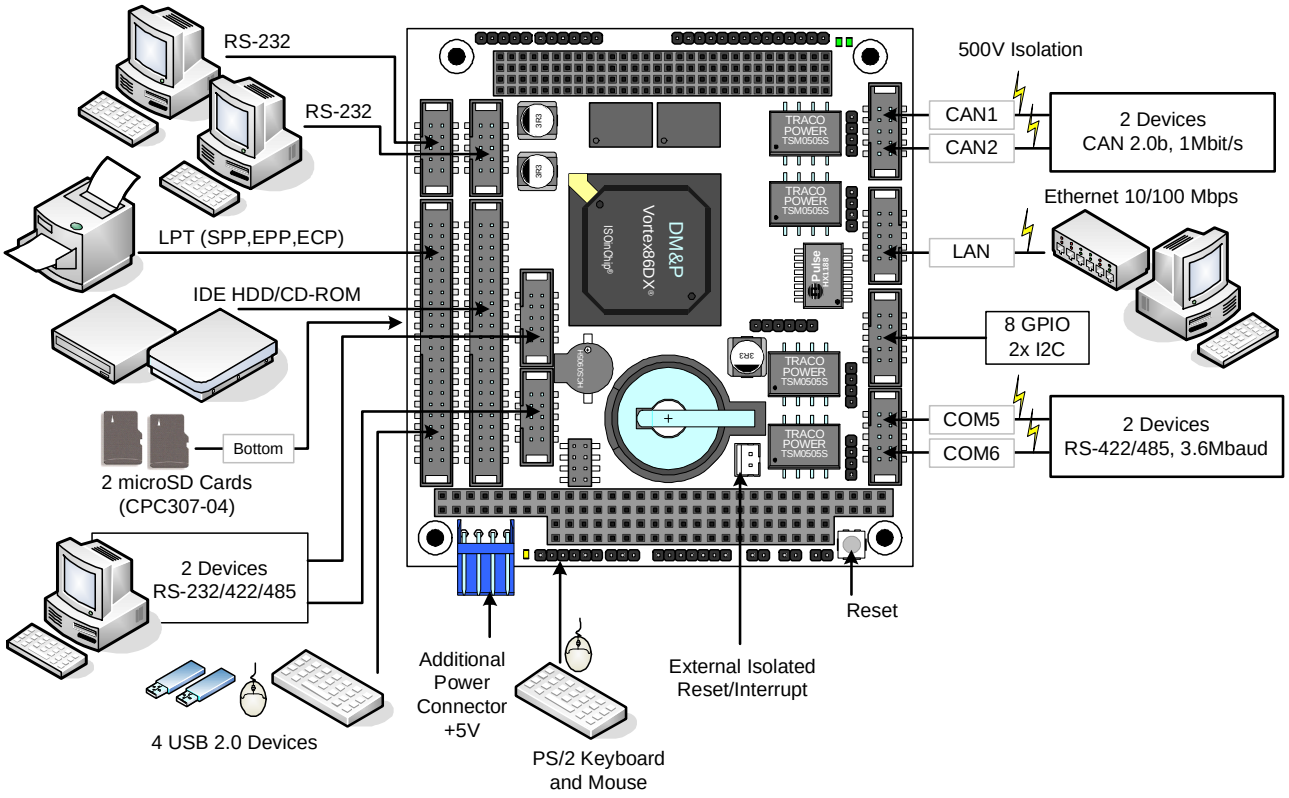
This product comprises electrostatically sensitive components. Please follow the ESD safety instructions to ensure module's operability and reliability:

- Use grounding equipment, if working at an anti-static workbench. Otherwise, discharge yourself and the tools in use before touching the sensitive equipment.
- Try to avoid touching contacts, leads and components.

Extra caution should be taken in cold and dry weather.

4.2 Connection of Peripheral Devices

Figure 4.1: External Devices Connection



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The following devices are necessary to put the module into operation:

- PC/104 power supply or an external power supply unit with +5 V and not less than 1 A output connected to XP20 power connector;
- A remote PC in console operation mode connected to one of COM ports (115200, 8, n, 1) selected in BIOS Setup.

The operating system is loaded from the on-board NAND Flash memory. Operating system on this flash-disk is FDOS supplemented with some service software utilities.

4.3 Software Installation

The installation of the peripheral drivers is described in the accompanying information files. For details on installation of an operating system, please refer to the relevant software documentation.

5 AMI BIOS

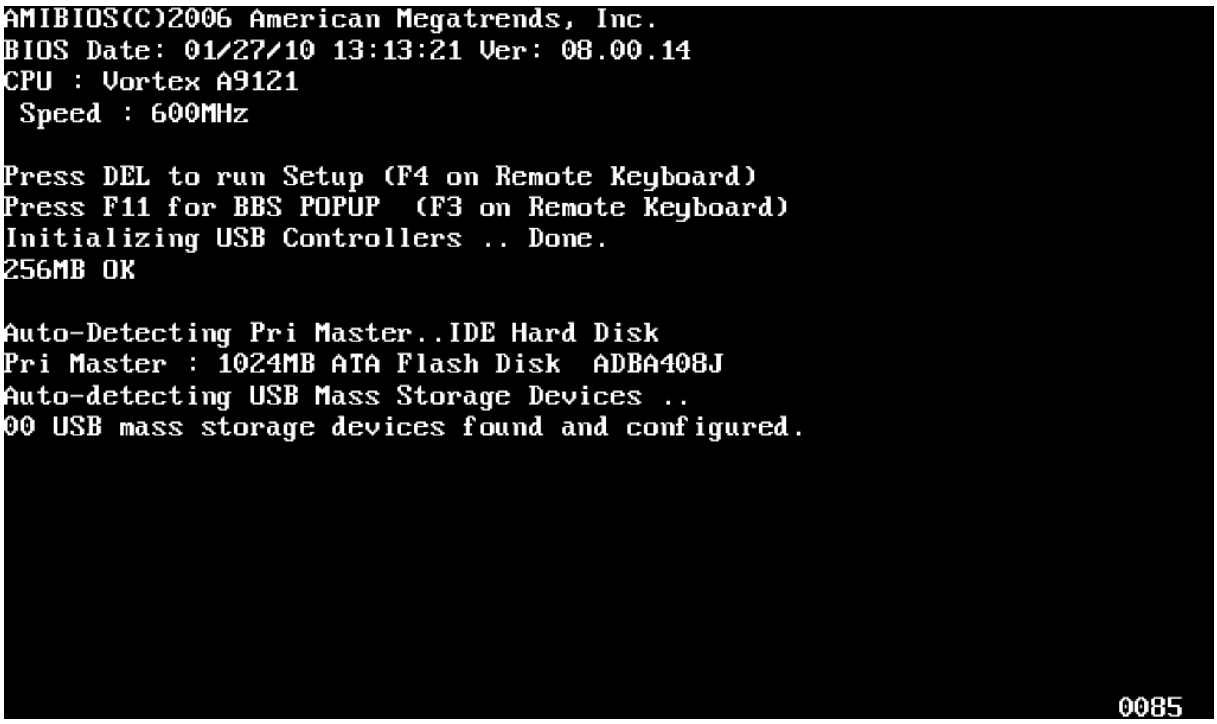
The AMI BIOS in CPC307 is an adapted version of a standard BIOS for IBM PC AT-compatible personal computers equipped with x86 compatible processors. BIOS provides low-level support for the central processing, memory, and I/O system units. System settings can be changed using the BIOS Setup program.

5.1 BIOS Setup Program. Introduction

With the BIOS Setup program, you can modify BIOS settings and control special features of the module. The Setup program offers a convenient menu interface to modify basic system configuration settings and switching between the subsystems operation modes. These settings are stored in a dedicated battery-backed memory, CMOS RAM, that keeps the information while the power is switched off. For extra safety, the system settings are stored also in the nonvolatile serial FRAM.

5.2 Main Menu

To start the BIOS Setup program switch on the power or restart the system. By default the startup screen looks like this:


AMIBIOS(C)2006 American Megatrends, Inc.
BIOS Date: 01/27/10 13:13:21 Ver: 08.00.14
CPU : Vortex A9121
Speed : 600MHz
Press DEL to run Setup (F4 on Remote Keyboard)
Press F11 for BBS POPUP (F3 on Remote Keyboard)
Initializing USB Controllers .. Done.
256MB OK
Auto-Detecting Pri Master..IDE Hard Disk
Pri Master : 1024MB ATA Flash Disk ADBA408J
Auto-detecting USB Mass Storage Devices ..
00 USB mass storage devices found and configured.
0085

To start BIOS Setup, press "Del" key on a keyboard after the message

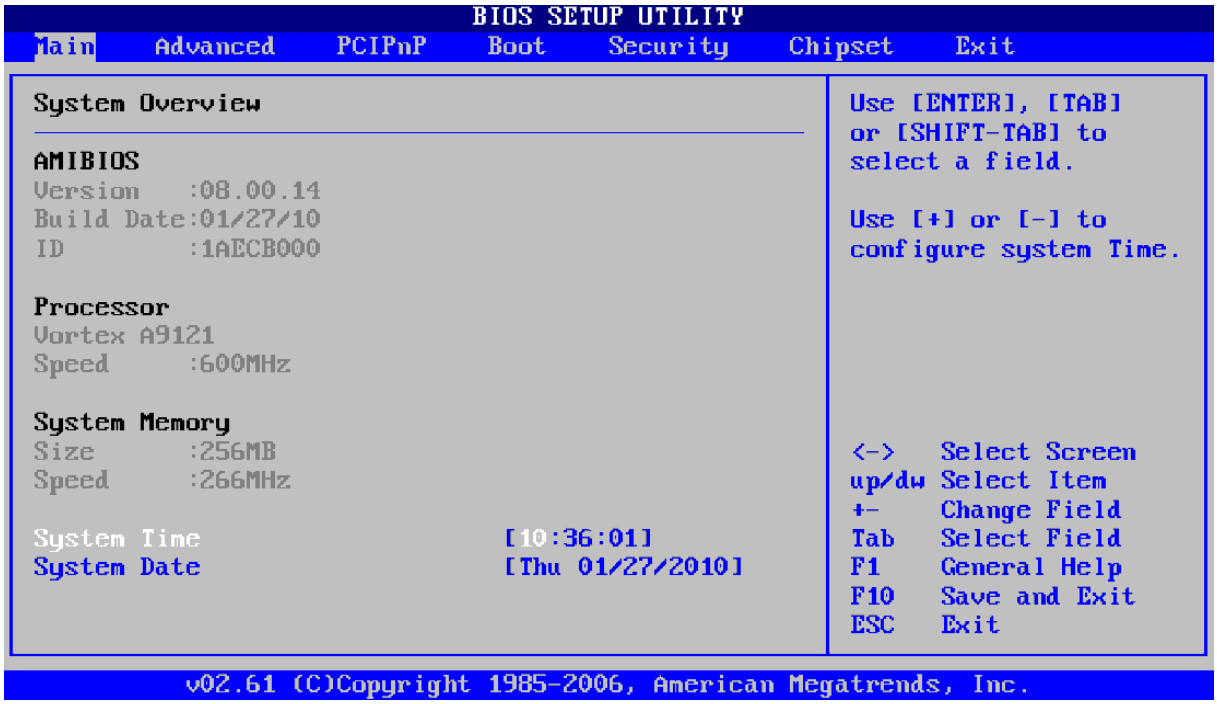
"Hit <Del> if you want to run SETUP"

appeared on the screen. This will lead you to the Main Menu screen, shown in the Figure below.

Attention!

In remote console mode the BIOS Setup utility is started by F4 on the keyboard of a remote PC with “Console Redirect” option enabled.

Figure 5.1: Main Menu Screen Image



The Main Menu items and their functions are described in the table below.

Table 5.1: Main Menu Items

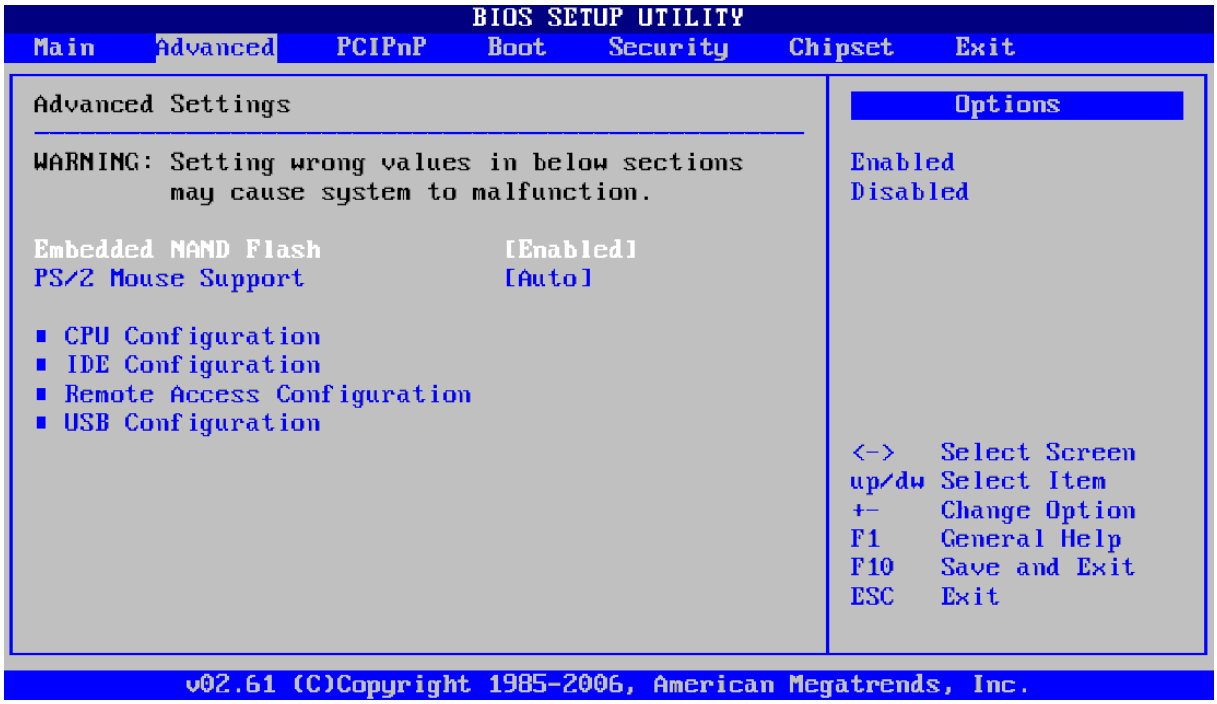
Menu Item	Purpose
(*TBA*)	

Use "Up" and "Down" cursor keys or <Tab> key to move between menu items. <Enter> selects the item and allows to proceed with the command or opens the submenu screen.

5.3 Advanced

On selection of this Main menu item the following screen is shown:

Figure 5.2: Advanced Screen Image



The following table presents explanations on "Advanced" menu screen.

Table 5.2: Advanced Menu Items

Menu Item	Function
(*TBA*)	

5.4 PCI Plug and Play

PCI Plug and Play menu screen is shown on the following figure:

Figure 5.3: PCI Plug and Play Menu Screen

The figure shows the default settings.

PCI Plug and Play menu items are described in the table below.

Table 5.3: PCI Plug and Play Menu Items

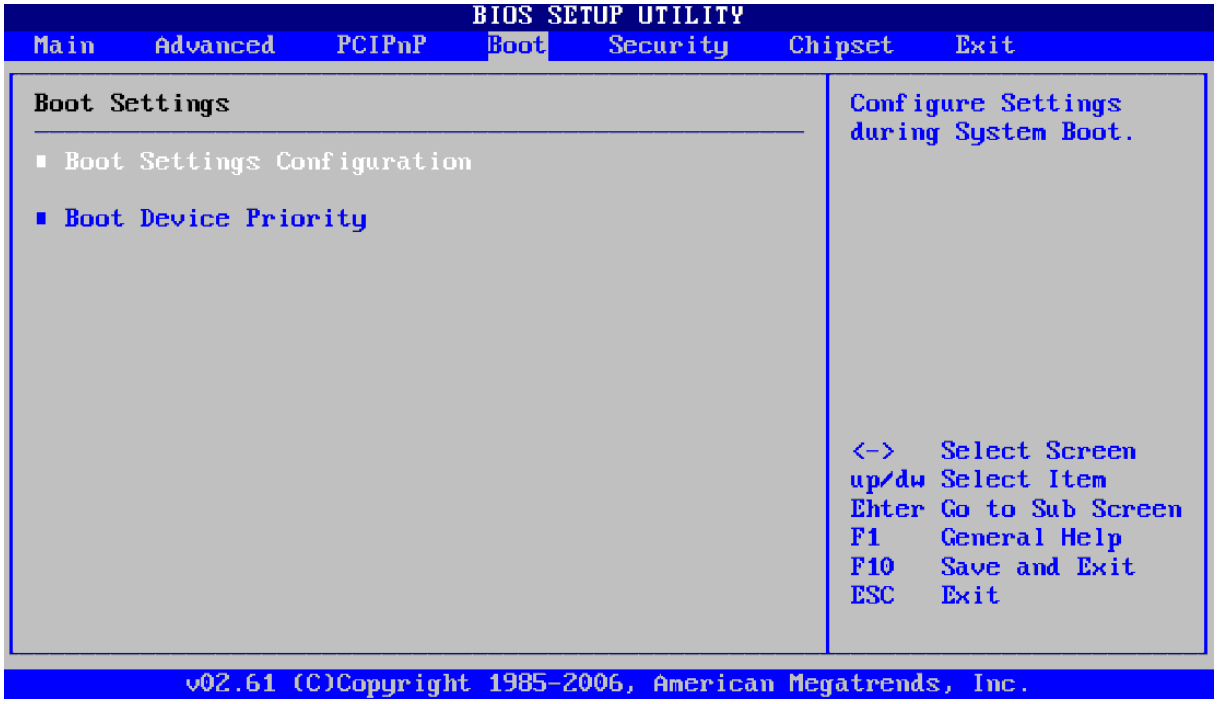
Menu Item	Options	Description
(*TBA*)		

Remember! Wrong or incorrect settings may lead to abnormal system performance.
To correct possible errors, restart the BIOS Setup program and restore manufacturer's settings by selection of “Reset CMOS to factory defaults” command in Main menu.

5.5 Boot Options

Boot menu screen is shown on the following figure:

Figure 5.4: Boot Menu Screen



The figure shows the default settings.

Boot menu items are described in the table below.

Table 5.4: Boot Menu Items

Menu Item	Options	Description
(*TBA*)		

Remember! Wrong or incorrect settings may lead to abnormal system performance.
To correct possible errors, restart the BIOS Setup program and restore manufacturer's settings by selection of “Reset CMOS to factory defaults” command in the Main menu.

5.6 Security Options

Security menu screen is shown on the following figure:

Figure 5.5: Security Menu Screen

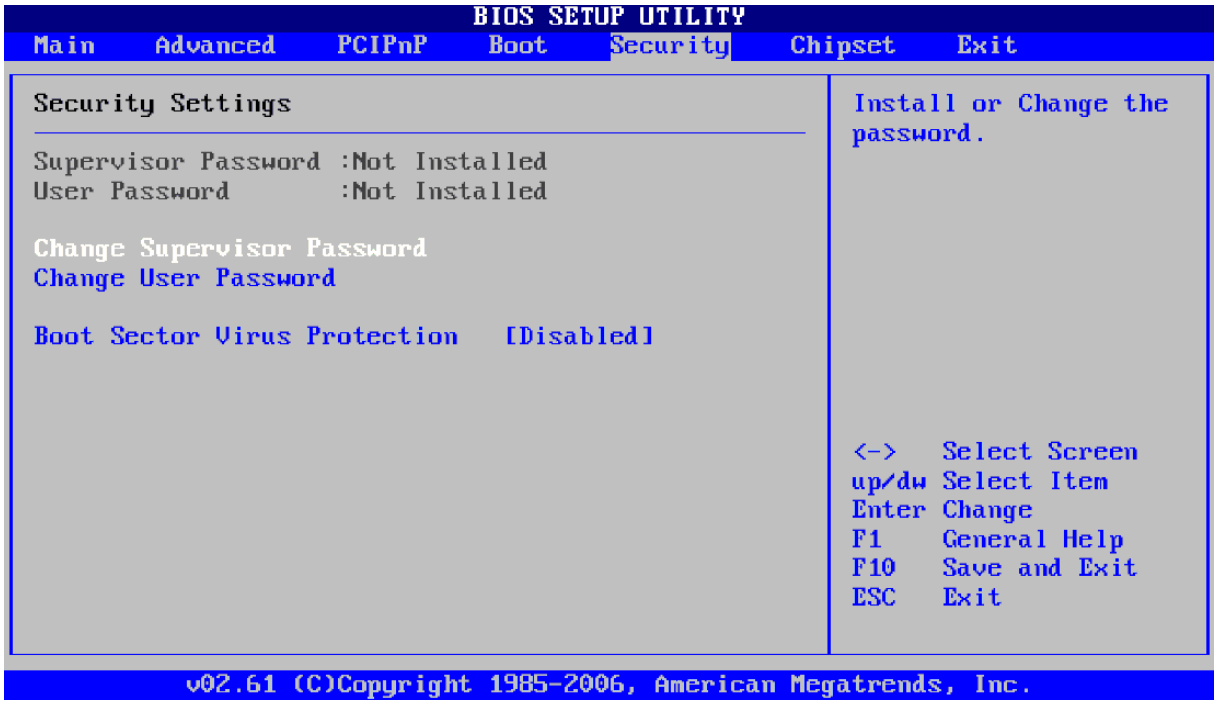


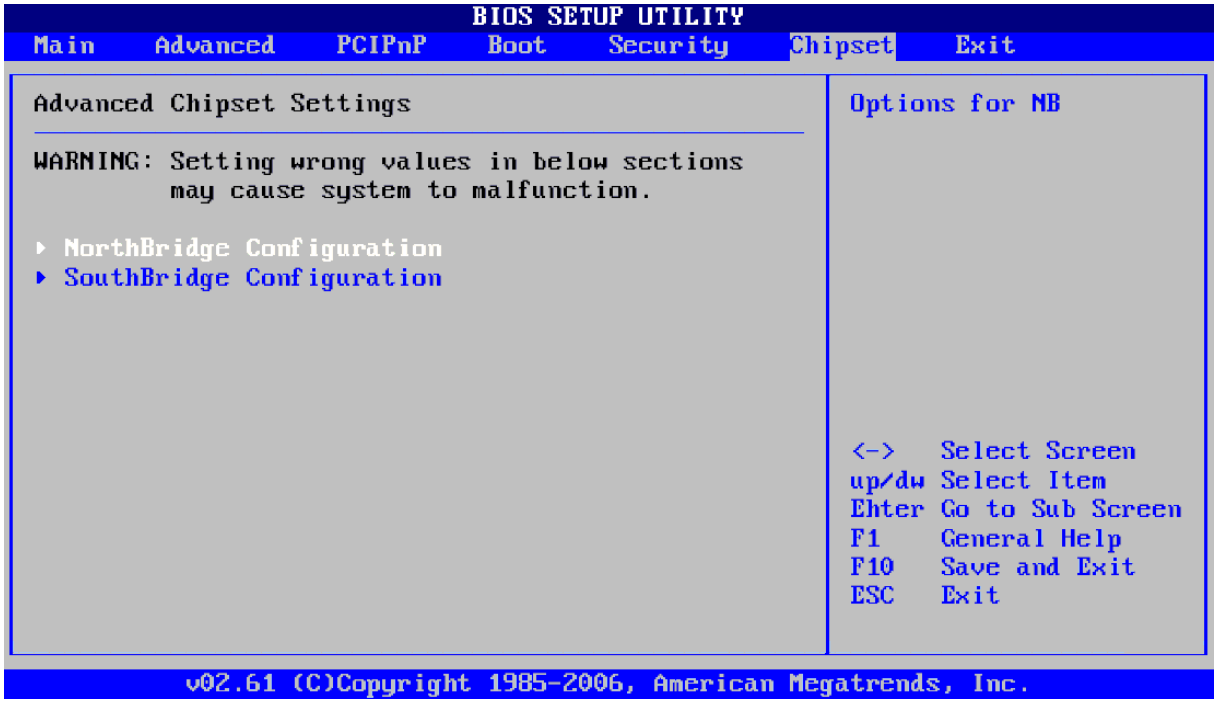
Table 5.5: Security Menu Items

Menu Item	Options	Description
(*TBA*)		

5.7 Chipset Menu

The menu screen is shown in the figure below.

Figure 5.6: Chipset Menu Screen Image



The figure shows the default settings.

Table 5.6: Chipset Menu Items

Menu Item	Options	Description
(*TBA*)		

5.8 Exit Menu

The figure below presents the Exit menu screen.

Figure 5.7: Exit Menu Screen Image

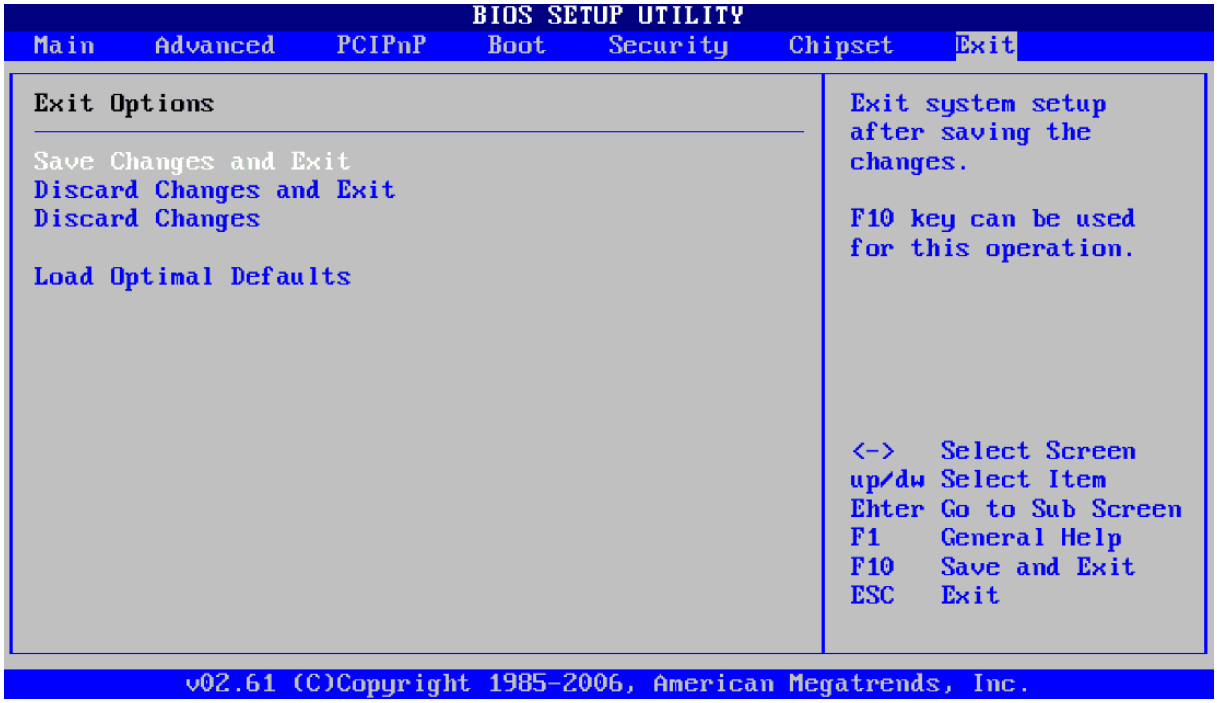

BIOS SETUP UTILITY
Main Advanced PCIPnP Boot Security Chipset Exit
Exit Options
Save Changes and Exit
Discard Changes and Exit
Discard Changes
Load Optimal Defaults
Exit system setup after saving the changes.
F10 key can be used for this operation.
<-> Select Screen
up/dw Select Item
Ehter Go to Sub Screen
F1 General Help
F10 Save and Exit
ESC Exit
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Table 5.7: Exit Menu Items

Menu Item	Options	Description
(*TBA*)		

5.9 BIOS Versions

(*TBA*)